program

OUR ADDRESS:

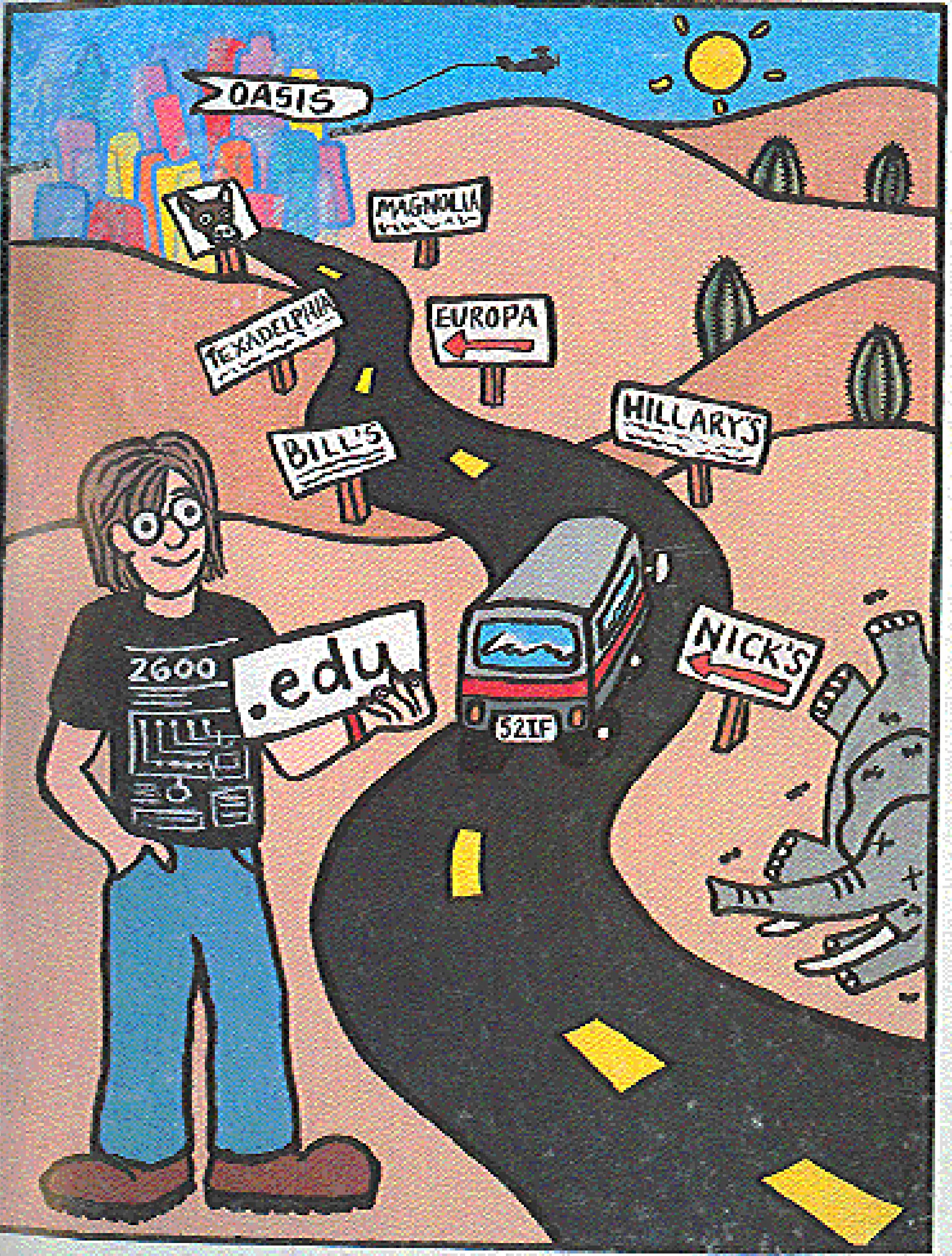
2600 Magazine
PO Box 752
Middle Island, NY 11953 U.S.A.

2600

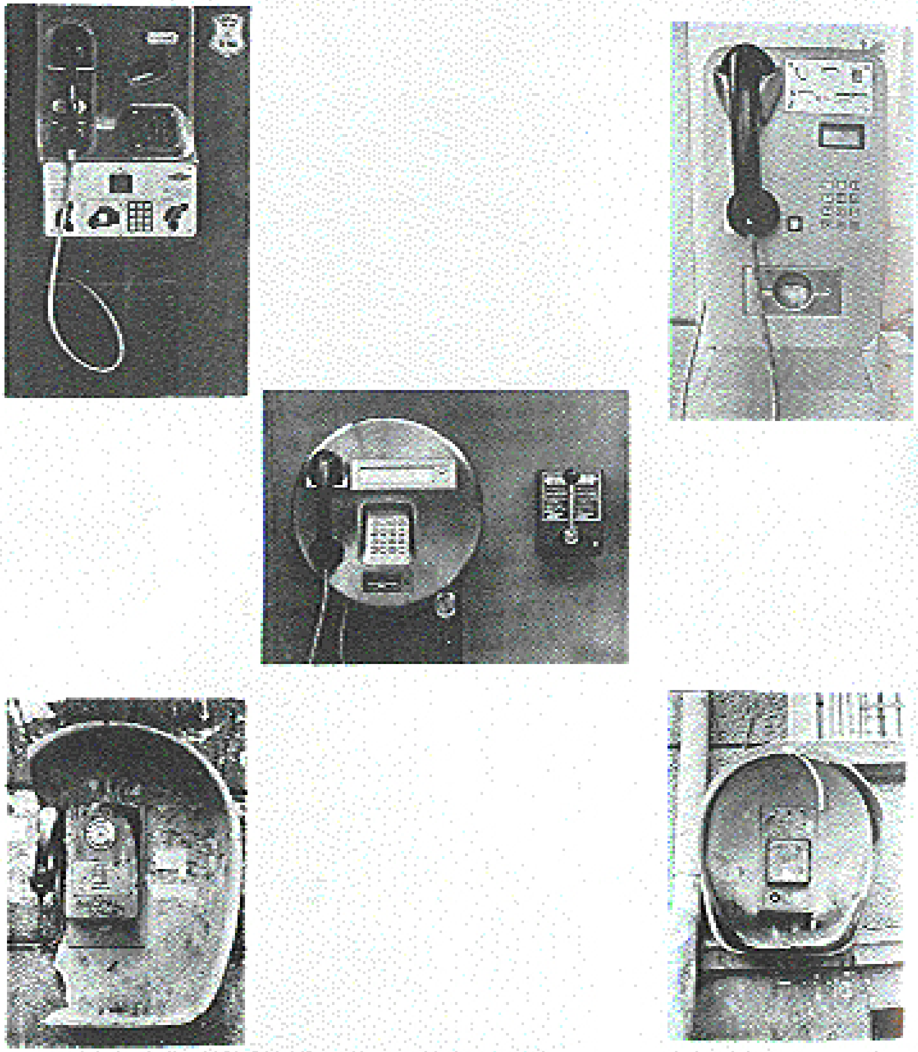
The Hacker Quarterly

TEXAS FEDEX NOFIVE!

VOLUME TEN, NUMBER ONE
SPRING 1993
$4



EUROPEAN PAYPHONES



LEFT TO RIGHT FROM THE TOP: **Budapest, Hungary; Salzburg, Austria; Munich, Germany (with emergency call handle - left for fire, right for police); Sofia, Bulgaria ("Out of Order" written above dialer); Sofia, Bulgaria ("Out of Order" strongly implied).** ***PHOTOS BY KISHON***

SEND YOUR PAYPHONE PHOTOS TO: 2600 PAYPHONES, PO BOX 99, MIDDLE ISLAND, NY 11953. REWARD FOR MONGOLIAN PAYPHONES!

2600 (ISSN 0749-3851) is published quarterly by 2600 Enterprises Inc., 7 Strong's Lane, Setauket, NY 11733. Second class postage permit paid at Setauket, New York.
POSTMASTER: Send address changes to
2600, P.O. Box 752, Middle Island, NY 11953-0752.
Copyright (c) 1993 2600 Enterprises, Inc.
Yearly subscription: U.S. and Canada --$21 individual, $50 corporate (U.S. funds).
Overseas -- $30 individual, $65 corporate.
Back issues available for 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992
at $25 per year, $30 per year overseas. Individual issues available
from 1988 on at $6.25 each, $7.50 each overseas.

ADDRESS ALL SUBSCRIPTION CORRESPONDENCE TO:
2600 Subscription Dept., P.O. Box 752, Middle Island, NY 11953-0752.
FOR LETTERS AND ARTICLE SUBMISSIONS, WRITE TO:
2600 Editorial Dept., P.O. Box 99, Middle Island, NY 11953-0099.
INTERNET ADDRESS: 2600@well.sf.ca.us

***2600* Office Line: 516-751-2600, *2600* FAX Line: 516-751-2608**

STAFF

Editor-In-Chief
Emmanuel Goldstein

Office Manager
Tampruf

Artwork
Affra Gibbs

"The Secret Service didn't do a good job in this case. We know no investigation took place. Nobody ever gave concern as to whether statutes were involved. We know there was damage." - Judge Sparks, Steve Jackson vs. Secret Service, January 28, 1993

Writers: Billsf, Blue Whale, Eric Corley, Count Zero, John Drake, Paul Estev, Mr. French, Bob Hardy, Inhuman, Knight Lightning, Kevin Mitnick, The Plague, Marshall Plann, David Ruderman, Bernie S., Silent Switchman, Scott Skinner, Mr. Upsetter, Dr. Williams, and the digital majority.
Technical Expertise: Rop Gonggrijp, Phiber Optik, Geo. C. Tilyou.
Shout Outs: Jon L., Steve J., Franklin, Ozona and the Austinites.

Cellular Magic

by Bootleg

Let me start out by saying this article won't be in the best of ordered content as I'll be skipping around a little quoting data from various manuals as it pops into my mind. It will however, allow anyone that reads it thoroughly and obtains the manuals and equipment specified within, to do virtually anything regarding cellular!

ESN: Electronic Serial Number (every cellular has one in Rom).

MIN: The cellular's phone number (also stored in every cellular's Rom).

Reverse Channel: The channel the cellular phone broadcasts on.

Forward Channel: The channel the cell site broadcasts on.

Remember these key terms as they are the secret to cellulars.

Most cellulars have the ESN/MIN located in an eprom/eeprom located somewhere on the circuit board (older cellulars may not have an ESN). These are usually 27c256 or 27c512 eproms which can be burned or changed by standard eprom burners. They also contain the cellular's programming which can be changed.

When you power up a cellular, it sends its ESN/MIN to the cell site on the reverse channel. The cell site then returns the MIN with an OK signal if their database verifies the ESN/MIN. Some newer cell site software will verify the ESN/MIN with the C.O. before allowing the call. If everything is OK, the cellular will then be able to place a call.

(The reverse channel's ESN/MIN and related data can be captured by equipment which we'll list later.)

It seems like some scoundrels have captured other people's ESN/MIN and burned new eproms enabling another cellular phones to act as the originals. Rumor has it that hackers have gone as far as actually changing the eproms' software whereby the program jumps past the ESN/MIN address in the eprom to an address location that can be programmed into memory via the handset! Yet another rumor has it that some even go as far as re-programming the software to capture other cellulars' ESN/MIN and automatically store the data in memory. This naturally allows someone to place fraudulent calls while frequently changing ESN/MINs to avoid all forms of detection. The cell sites usually use frequencies on the non-wireline A band as forward channels. The reverse channels are usually 45 mhz below the forward channels. These reverse channels are the ones scanned by "unsavory dogs" who steal others' ESN/MINs for fraudulent use. Note that one hacker seems to think one can use a Z80 Uncompiler/Compiler on the eproms' software of some cellulars. (The shame of it all!) Other cellulars use different but common microprocessors of which compilers/decompilers are easily available.

Now that you have the theory behind cellular phreaking, I'll continue on to some background and tech stuff you'll need.

Cellular Overview

A cell system divides the service area into small, low power areas called cells. A cell system has a continuous pattern of these cells, each having a 1 to 40 mile radius (usually 5-10 miles). Within each cell is a base station which contains several transceivers and control equipment for the channels assigned to that cell. These are all connected to an MTSO which is in turn connected to a CO (Central Office) switch. Each cell operates on an assigned channel and may have numerous paging and voice channels assigned to it.

The cellular radio frequencies have been divided by the FCC into two equal bands to allow two different systems to co-exist and compete in the same area. Originally there were 666 channels, but that was expanded to 832 in 1988, and with NAMPS to 2412 in 1991.

Band A
Non Wireline
Voice channels: 001-312
Control channels: 313-333
(395 AMPS/1165 NAMPS)

Band B
Wireline
Voice channels: 355-666
Control channels: 334-354
(395 AMPS/1155 NAMPS)

Control channels are used to send and receive only digital data between the cellular phone and the cell base station. The 21 control channels in each band may be dedicated to two different applications: access and paging channels.

The data on the forward control channels provides such info as the system identification number and range of channels to scan to find the access and paging channels. Access channels are used to respond to a page or to originate a call. The system and the cell phone will use access channels where 2-way data transfer occurs to determine the initial voice channel. Paging channels, if used, are the holding place for an idle cell phone. When the call is received at the central controller for a cellular phone, the paging signalling will start on a paging channel. In many systems, both control channel functions will be served by the same access channel for a particular cell. Multiple paging channels are only used in high density areas.

NAM: Number assignment Module. This is a memory component (usually an eprom/eeprom) that contains a cell phone's ESN/MIN/SCM, lock code, etc. Some phones can be re-programmed via the handset so one can change their MIN several times (usually the phone's software locks it up after three to 20 MIN changes). This feature was used to deceive cell sites when roaming. Newer cell site software is quickly making this trick obsolete (the problem being that one cannot change the ESN via NAM handset programming unless one re-writes the eprom software).

One must know, there is no distributed intelligence in the first generation of cellular systems! At these cellular base stations there is little or no monitoring equipment of any kind.

There are a mix of 3 watt, 1.2 watt, and 600 milliwatt cellular phones in use today. (Keep this in mind as the power of a cellular phone is stored in ROM and transmitted along with the ESN/MIN and the coding must be correct.) 3 watt = mobiles, 1.6 watt = transportables, 600 milliwatt = portables.

IS-41: The newest standard that will let cell switches from different vendors hand-off and deliver calls and transfer subscriber data profiles (newest version is Revision B). This document contains tons of useful info and can be found at public libraries, etc. IS-41 rev b is published by AT&T, although the original rev 0 published in 1987 or rev A published in 1990 may come in handy when dealing with older/smaller MTSO's (Mobile Telephone Switching Offices) that haven't upgraded yet.

MTSO's typically use fiber optic links to cell sites or an 18 ghz microwave link. A cell site in turn then probably uses a 38 ghz microwave link to a microcell transmitter. TDMA and CDMA are both vying to become the industry standard.

SS7: As soon as a user turns on a cell phone the MIN/ESN for that phone will be carried as an SS7 network message to a database, known as the home location register (HLR), within the user's home carrier system. The HLR will provide information for validation as well as customer profile info for advanced features such as voice mail. That info will then be be relayed to a second database, the visitor location register, maintained by the carrier that is hosting the roaming call. They hope to reduce fraud by checking the ESN with real time validation on a per call basis. The current system is unable to detect fraud until after a caller has made his first call. (This system simply uses a customer's calling profile to detect an unusual calling pattern.) Those changing ESN/MIN's often cannot be detected!

Cell relay uses fixed length packets - 48 bytes for the payload and five bytes for the header. Two existing cell relay standards are IEEE 802.6 (DQDB) and ATM. They differ only in content of the header.

Each cellular has two channels associated with it, the transmit (REVERSE) and the receive (FORWARD).

Reverse freqs: 824-848 mhz

Forward freqs: 869-894 mhz

Conventional dispatch: 806-809.7 mhz and 851-854.75 mhz

Trunked dispatch: 809.75-824 mhz and 854.75-869 mhz

General reserve: 848-851 mhz, 894-902 mhz, and 928-947 mhz

Channel spacing: 30 mhz AMPS or 10 mhz NAMPS

Reverse Channel Info

Voice channels are used primarily for conversation, with signaling used with quick data bursts or tones to handle cell to cell handoffs, output power control of the cellular radio-phone, and special control features. Forward data from the cell site and reverse data from the cell phone are sent using frequency shift keying. The data is formatted into groups of words with a distinct binary preamble that allows the receiver to synchronize to the incoming data. With AMPS, various tones are used. With NAMPS, the data and tones have been replaced by sub-audible digital equivalents that ride under the audio. (See EIA - 553 for AMPS or Motorola's NAMPS air interface specification for NAMPS.)

Signaling Tone (ST) and Digital ST (DST)

In AMPS, the signalling tone is a 10 khz signal used by the mobile on the REVERSE channel (REVC) to signal activities or to acknowledge commands from the cell site, including handoffs, alert orders, call terminations, and switch-hook operation. Various burst lengths are used on different ST activities. On NAMPS channels ST is replaced by a digital equivalent called Digital ST (DST) which is the complement of the assigned DSAT. The 10 khz signal is sent for 50 milliseconds.

SAT (Supervisory Audio Tone) and DSAT (Digital SAT)

The supervisory audio tone (SAT) is one of three frequencies:

SAT 0: 5970 hz; **SAT 1:** 6000 hz; **SAT 2:** 6030 hz (plus or minus 2 khz on these three frequencies)

These are used in AMPS signaling. On NAMPS channels SAT is replaced by one of seven sub-audible digital equivalents or vectors called DSAT.

SAT or DSAT is generated by the cell site, checked for frequency or accuracy by the cell phone, then transponded back to the cell site on the REVERSE voice channel (REVC). The cellular telephone uses (D)SAT to verify that it is tuned to the correct channel after a new voice channel assignment. When the CO signals the mobile regarding the new voice channel, it also tells the mobile of the SAT freq of the (D)SAT vector to expect on the new channel. The returned (D)SAT is used at the cell site to verify the presence of the telephone's signal on the designated frequency.

DSAT: +/- 700 hz deviation

Data: Transmitted at 10 kbits/sec. Used for sending system orders and mobile identification. In cellular the data is transmitted as Frequency Key Shifting, where the carrier is shifted high 8 khz in AMPS (700 hz in NAMPS) to represent a logic high (or 1), and the carrier is shifted low 8 khz in AMPS (700 hz in NAMPS) to represent a logic low (or 0).

Control channels carry data only. Voice channels carry data and other signals listed here.

Audio: includes all microphone audio and DTMF while in a call (maximum +/- 12 khz deviation AMPS, +/- 5 khz dev NAMPS). DTMF uses two tones (one high, one low) from a selection of seven tones (four low, three high tones) to indicate digits being dialed. In AMPS signalling, audio and ST are accompanied by SAT.

Placing a call from a Cellular Phone

When first turned on, the cellular scans through the FOCC's and measures the strength of each signal. It will then tune to the strongest and attempt to decode the overhead control message. From the overhead the phone can determine if it is in its home system and the range of channels to scan for paging and access. If paging channels are used, the phone next scans each paging channel in the specified range and tunes to the strongest one. It's on that channel that the phone will continuously receive overhead message info plus paging messages. At this point the phone idles, continuously updating the overhead message info in its memory and monitoring the paging messages for its telephone number.

When the cellular phone user originates the call, the phone rescans the access channels to insure that it's tuned to the strongest one. It then transmits at 10 kbits per sec on the control channel to notify the switch of its MIN (mobile identification number (phone number)), its ESN, and the number it wants to reach. The switch verifies the incoming data and assigns a voice channel and an SAT (or DSAT for NAMPS) to the telephone. The phone tunes to the assigned voice channel and verifies the presence of the proper forward SAT frequency or DSAT message. If SAT (DSAT) is correct the phone transponds SAT (DSAT) back to the cell site and unmutes the forward audio. The cell site detects reverse SAT (DSAT) from the cellular and unmutes reverse audio. At this point the user can hear the other end ring. SAT (DSAT) is sent and received more or less continuously by both the base station and the phone but SAT (DSAT) is not sent during data transmissions and the phone does not transpond SAT continuously during VOX operation. DSAT is suspended during the transmission of DST. SAT ? signalling tones are only used on AMPS voice channels and the signalling tone is only transmitted by the cellular phone.

Note that the number called, the ESN, MIN etc. are transmitted four or five times and it only takes 200 milliseconds for all of this data exchange.

Formulae

Call termination: 10 khz tone burst for 1.8 seconds.

Freq calc for channels 1-799

Reverse = 825mhz + (Ch.# X .03 mhz)
Forward = 870mhz + (Ch.# X .03 mhz)

Freq calc for channels 991-1023

Reverse = 825mhz - (.03 mhz X(1023-Ch#))
Forward = 870mhz - (.03 mhz X(1023-Ch#))
Duplex spacing = 45 mhz

Station Class Mark (SCM)

SCM	666 or 832 Ch.	VOX	Max Power in Watts
00	666	n	3
01	666	n	1.2
02	666	n	.6
03			
04	666	y	3
05	666	y	1.2
06	666	y	.6
07			
08	832	n	3
09	832	n	1.2
10	832	n	.6
11			
12	832	y	3
13	832	y	1.2
14	832	y	.6
15			

If the SCM is not set properly during programming the system it might have adverse effects on the operation of the phone. It may also flag security software to a "Tumbled Phone". Smart cell phreaks will only use ESN/MIN's that have the same SCM as their own phone that they plan on tumbling.

Cellular Phone Channel Construction

Here is a method of determining which frequencies are used in a cellular system, and which ones are in what cells. If the system uses OMNICELLS, as most do, you can readily find all the channels in a cell if you know just one of them, using tables constructed with the instructions below.

Cellular frequencies are assigned by channel number, and for all channel numbers, in both wireline and non-wireline systems, the formula is:

Transmit Frequency: (channel number x .030 MHz) + 870 MHz

Receive Frequency: (channel number x .030 MHz) + 825 Mhz

"Band A" (one of the two blocks) uses channels 1 to 333. To construct a table showing frequency by cells, use channel 333 as the top left corner of a table. The next entry to the right of channel 333 is 332, the next is 331, etc., down to channel 313. Enter channel 312 underneath 333, 311 under 332, etc. Each channel across the top row is the first channel in each cell of the system, each channel down from the column from the first channel is the next frequency assigned to that cell. You may have noted that each channel down is 21 channels lower in number. Usually the data channel used is the highest numbered channel in a cell.

"Band B" uses channels 334 to 666. Construct your table in a similar way, with channel 334 in the upper left corner, 335 the next entry to the right. The data channel should be the lowest numbered channel in each cell this time.

Cellular Phone Band A
(Channel 1 is Data)

Cell # 1

Channel 1 (333) Tx 879.990 Rx 834.990
Channel 2 (312) Tx 879.360 Rx 834.360
Channel 3 (291) Tx 878.730 Rx 833.730
Channel 4 (270) Tx 878.100 Rx 833.100
Channel 5 (249) Tx 877.470 Rx 832.470
Channel 6 (228) Tx 876.840 Rx 831.840
Channel 7 (207) Tx 876.210 Rx 831.210
Channel 8 (186) Tx 875.580 Rx 830.580
Channel 9 (165) Tx 874.950 Rx 829.950
Channel 10 (144) Tx 874.320 Rx 829.320
Channel 11 (123) Tx 873.690 Rx 828.690
Channel 12 (102) Tx 873.060 Rx 828.060
Channel 13 (81) Tx 872.430 Rx 827.430
Channel 14 (60) Tx 871.800 Rx 826.800
Channel 15 (39) Tx 871.170 Rx 826.170
Channel 16 (18) Tx 870.540 Rx 825.540

Cell # 2

Channel 1 (332) Tx 879.960 Rx 834.960
Channel 2 (311) Tx 879.330 Rx 834.330
Channel 3 (290) Tx 878.700 Rx 833.700
Channel 4 (269) Tx 878.070 Rx 833.070
Channel 5 (248) Tx 877.440 Rx 832.440
Channel 6 (227) Tx 876.810 Rx 831.810
Channel 7 (206) Tx 876.180 Rx 831.180
Channel 8 (185) Tx 875.550 Rx 830.550
Channel 9 (164) Tx 874.920 Rx 829.920
Channel 10 (143) Tx 874.290 Rx 829.290
Channel 11 (122) Tx 873.660 Rx 828.660
Channel 12 (101) Tx 873.030 Rx 828.030
Channel 13 (80) Tx 872.400 Rx 827.400
Channel 14 (59) Tx 871.770 Rx 826.770
Channel 15 (38) Tx 871.140 Rx 826.140
Channel 16 (17) Tx 870.510 Rx 825.510

Cell # 3

Channel 1 (331) Tx 879.930 Rx 834.930
Channel 2 (310) Tx 879.300 Rx 834.300
Channel 3 (289) Tx 878.670 Rx 833.670
Channel 4 (268) Tx 878.040 Rx 833.040
Channel 5 (247) Tx 877.410 Rx 832.410
Channel 6 (226) Tx 876.780 Rx 831.780
Channel 7 (205) Tx 876.150 Rx 831.150
Channel 8 (184) Tx 875.520 Rx 830.520
Channel 9 (163) Tx 874.890 Rx 829.890
Channel 10 (142) Tx 874.260 Rx 829.260
Channel 11 (121) Tx 873.630 Rx 828.630
Channel 12 (100) Tx 873.000 Rx 828.000
Channel 13 (79) Tx 872.370 Rx 827.370
Channel 14 (58) Tx 871.740 Rx 826.740
Channel 15 (37) Tx 871.110 Rx 826.110
Channel 16 (16) Tx 870.480 Rx 825.480

Cell # 4

Channel 1 (330) Tx 879.900 Rx 834.900
Channel 2 (309) Tx 879.270 Rx 834.270
Channel 3 (288) Tx 878.640 Rx 833.640
Channel 4 (267) Tx 878.010 Rx 833.010
Channel 5 (246) Tx 877.380 Rx 832.380
Channel 6 (225) Tx 876.750 Rx 831.750
Channel 7 (204) Tx 876.120 Rx 831.120
Channel 8 (183) Tx 875.490 Rx 830.490
Channel 9 (162) Tx 874.860 Rx 829.860
Channel 10 (141) Tx 874.230 Rx 829.230
Channel 11 (120) Tx 873.600 Rx 828.600
Channel 12 (99) Tx 872.970 Rx 827.970
Channel 13 (78) Tx 872.340 Rx 827.340
Channel 14 (57) Tx 871.710 Rx 826.710
Channel 15 (36) Tx 871.080 Rx 826.080
Channel 16 (15) Tx 870.450 Rx 825.450

Cell # 5

Channel 1 (329) Tx 879.870 Rx 834.870
Channel 2 (308) Tx 879.240 Rx 834.240
Channel 3 (287) Tx 878.610 Rx 833.610
Channel 4 (266) Tx 877.980 Rx 832.980
Channel 5 (245) Tx 877.350 Rx 832.350
Channel 6 (224) Tx 876.720 Rx 831.720
Channel 7 (203) Tx 876.090 Rx 831.090
Channel 8 (182) Tx 875.460 Rx 830.460
Channel 9 (161) Tx 874.830 Rx 829.830
Channel 10 (140) Tx 874.200 Rx 829.200
Channel 11 (119) Tx 873.570 Rx 828.570
Channel 12 (98) Tx 872.940 Rx 827.940
Channel 13 (77) Tx 872.310 Rx 827.310
Channel 14 (56) Tx 871.680 Rx 826.680
Channel 15 (35) Tx 871.050 Rx 826.050
Channel 16 (14) Tx 870.420 Rx 825.420

Cell # 6

Channel 1 (328) Tx 879.840 Rx 834.840
Channel 2 (307) Tx 879.210 Rx 834.210
Channel 3 (286) Tx 878.580 Rx 833.580
Channel 4 (265) Tx 877.950 Rx 832.950
Channel 5 (244) Tx 877.320 Rx 832.320
Channel 6 (223) Tx 876.690 Rx 831.690
Channel 7 (202) Tx 876.060 Rx 831.060
Channel 8 (181) Tx 875.430 Rx 830.430
Channel 9 (160) Tx 874.800 Rx 829.800
Channel 10 (139) Tx 874.170 Rx 829.170
Channel 11 (118) Tx 873.540 Rx 828.540
Channel 12 (97) Tx 872.910 Rx 827.910
Channel 13 (76) Tx 872.280 Rx 827.280
Channel 14 (55) Tx 871.650 Rx 826.650
Channel 15 (34) Tx 871.020 Rx 826.020
Channel 16 (13) Tx 870.390 Rx 825.390

Cell # 7

Channel 1 (327) Tx 879.810 Rx 834.810
Channel 2 (306) Tx 879.180 Rx 834.180
Channel 3 (285) Tx 878.550 Rx 833.550
Channel 4 (264) Tx 877.920 Rx 832.920
Channel 5 (243) Tx 877.290 Rx 832.290
Channel 6 (222) Tx 876.660 Rx 831.660
Channel 7 (201) Tx 876.030 Rx 831.030
Channel 8 (180) Tx 875.400 Rx 830.400
Channel 9 (159) Tx 874.770 Rx 829.770
Channel 10 (138) Tx 874.140 Rx 829.140
Channel 11 (117) Tx 873.510 Rx 828.510
Channel 12 (96) Tx 872.880 Rx 827.880
Channel 13 (75) Tx 872.250 Rx 827.250
Channel 14 (54) Tx 871.620 Rx 826.620
Channel 15 (33) Tx 870.990 Rx 825.990
Channel 16 (12) Tx 870.360 Rx 825.360

Cell # 8

Channel 1 (326) Tx 879.780 Rx 834.780
Channel 2 (305) Tx 879.150 Rx 834.150
Channel 3 (284) Tx 878.520 Rx 833.520
Channel 4 (263) Tx 877.890 Rx 832.890
Channel 5 (242) Tx 877.260 Rx 832.260
Channel 6 (221) Tx 876.630 Rx 831.630
Channel 7 (200) Tx 876.000 Rx 831.000
Channel 8 (179) Tx 875.370 Rx 830.370
Channel 9 (158) Tx 874.740 Rx 829.740
Channel 10 (137) Tx 874.110 Rx 829.110
Channel 11 (116) Tx 873.480 Rx 828.480
Channel 12 (95) Tx 872.850 Rx 827.850
Channel 13 (74) Tx 872.220 Rx 827.220
Channel 14 (53) Tx 871.590 Rx 826.590
Channel 15 (32) Tx 870.960 Rx 825.960
Channel 16 (11) Tx 870.330 Rx 825.330

Cell # 9

Channel 1 (325) Tx 879.750 Rx 834.750
Channel 2 (304) Tx 879.120 Rx 834.120
Channel 3 (283) Tx 878.490 Rx 833.490
Channel 4 (262) Tx 877.860 Rx 832.860
Channel 5 (241) Tx 877.230 Rx 832.230
Channel 6 (220) Tx 876.600 Rx 831.600
Channel 7 (199) Tx 875.970 Rx 830.970
Channel 8 (178) Tx 875.340 Rx 830.340
Channel 9 (157) Tx 874.710 Rx 829.710
Channel 10 (136) Tx 874.080 Rx 829.080
Channel 11 (115) Tx 873.450 Rx 828.450
Channel 12 (94) Tx 872.820 Rx 827.820
Channel 13 (73) Tx 872.190 Rx 827.190
Channel 14 (52) Tx 871.560 Rx 826.560
Channel 15 (31) Tx 870.930 Rx 825.930
Channel 16 (10) Tx 870.300 Rx 825.300

Cell # 10

Channel 1 (324) Tx 879.720 Rx 834.720
Channel 2 (303) Tx 879.090 Rx 834.090
Channel 3 (282) Tx 878.460 Rx 833.460
Channel 4 (261) Tx 877.830 Rx 832.830
Channel 5 (240) Tx 877.200 Rx 832.200
Channel 6 (219) Tx 876.570 Rx 831.570
Channel 7 (198) Tx 875.940 Rx 830.940
Channel 8 (177) Tx 875.310 Rx 830.310
Channel 9 (156) Tx 874.680 Rx 829.680
Channel 10 (135) Tx 874.050 Rx 829.050
Channel 11 (114) Tx 873.420 Rx 828.420
Channel 12 (93) Tx 872.790 Rx 827.790
Channel 13 (72) Tx 872.160 Rx 827.160
Channel 14 (51) Tx 871.530 Rx 826.530
Channel 15 (30) Tx 870.900 Rx 825.900
Channel 16 (9) Tx 870.270 Rx 825.270

Cell # 11

Channel 1 (323) Tx 879.690 Rx 834.690
Channel 2 (302) Tx 879.060 Rx 834.060
Channel 3 (281) Tx 878.430 Rx 833.430
Channel 4 (260) Tx 877.800 Rx 832.800
Channel 5 (239) Tx 877.170 Rx 832.170
Channel 6 (218) Tx 876.540 Rx 831.540
Channel 7 (197) Tx 875.910 Rx 830.910
Channel 8 (176) Tx 875.280 Rx 830.280
Channel 9 (155) Tx 874.650 Rx 829.650
Channel 10 (134) Tx 874.020 Rx 829.020
Channel 11 (113) Tx 873.390 Rx 828.390
Channel 12 (92) Tx 872.760 Rx 827.760
Channel 13 (71) Tx 872.130 Rx 827.130
Channel 14 (50) Tx 871.500 Rx 826.500
Channel 15 (29) Tx 870.870 Rx 825.870
Channel 16 (8) Tx 870.240 Rx 825.240

Cell # 12

Channel 1 (322) Tx 879.660 Rx 834.660
Channel 2 (301) Tx 879.030 Rx 834.030
Channel 3 (280) Tx 878.400 Rx 833.400
Channel 4 (259) Tx 877.770 Rx 832.770
Channel 5 (238) Tx 877.140 Rx 832.140
Channel 6 (217) Tx 876.510 Rx 831.510
Channel 7 (196) Tx 875.880 Rx 830.880
Channel 8 (175) Tx 875.250 Rx 830.250
Channel 9 (154) Tx 874.620 Rx 829.620
Channel 10 (133) Tx 873.990 Rx 828.990
Channel 11 (112) Tx 873.360 Rx 828.360
Channel 12 (91) Tx 872.730 Rx 827.730
Channel 13 (70) Tx 872.100 Rx 827.100
Channel 14 (49) Tx 871.470 Rx 826.470
Channel 15 (28) Tx 870.840 Rx 825.840
Channel 16 (7) Tx 870.210 Rx 825.210

Cell # 13

Channel 1 (321) Tx 879.630 Rx 834.630
Channel 2 (300) Tx 879.000 Rx 834.000
Channel 3 (279) Tx 878.370 Rx 833.370
Channel 4 (258) Tx 877.740 Rx 832.740
Channel 5 (237) Tx 877.110 Rx 832.110
Channel 6 (216) Tx 876.480 Rx 831.480
Channel 7 (195) Tx 875.850 Rx 830.850
Channel 8 (174) Tx 875.220 Rx 830.220
Channel 9 (153) Tx 874.590 Rx 829.590
Channel 10 (132) Tx 873.960 Rx 828.960
Channel 11 (111) Tx 873.330 Rx 828.330
Channel 12 (90) Tx 872.700 Rx 827.700

Channel 13 (69) Tx 872.070 Rx 827.070
Channel 14 (48) Tx 871.440 Rx 826.440
Channel 15 (27) Tx 870.810 Rx 825.810
Channel 16 (6) Tx 870.180 Rx 825.180

Cell # 14

Channel 1 (320) Tx 879.600 Rx 834.600
Channel 2 (299) Tx 878.970 Rx 833.970
Channel 3 (278) Tx 878.340 Rx 833.340
Channel 4 (257) Tx 877.710 Rx 832.710
Channel 5 (236) Tx 877.080 Rx 832.080
Channel 6 (215) Tx 876.450 Rx 831.450
Channel 7 (194) Tx 875.820 Rx 830.820
Channel 8 (173) Tx 875.190 Rx 830.190
Channel 9 (152) Tx 874.560 Rx 829.560
Channel 10 (131) Tx 873.930 Rx 828.930
Channel 11 (110) Tx 873.300 Rx 828.300
Channel 12 (89) Tx 872.670 Rx 827.670
Channel 13 (68) Tx 872.040 Rx 827.040
Channel 14 (47) Tx 871.410 Rx 826.410
Channel 15 (26) Tx 870.780 Rx 825.780
Channel 16 (5) Tx 870.150 Rx 825.150

Cell # 15

Channel 1 (319) Tx 879.570 Rx 834.570
Channel 2 (298) Tx 878.940 Rx 833.940
Channel 3 (277) Tx 878.310 Rx 833.310
Channel 4 (256) Tx 877.680 Rx 832.680
Channel 5 (235) Tx 877.050 Rx 832.050
Channel 6 (214) Tx 876.420 Rx 831.420
Channel 7 (193) Tx 875.790 Rx 830.790
Channel 8 (172) Tx 875.160 Rx 830.160
Channel 9 (151) Tx 874.530 Rx 829.530
Channel 10 (130) Tx 873.900 Rx 828.900
Channel 11 (109) Tx 873.270 Rx 828.270
Channel 12 (88) Tx 872.640 Rx 827.640
Channel 13 (67) Tx 872.010 Rx 827.010
Channel 14 (46) Tx 871.380 Rx 826.380
Channel 15 (25) Tx 870.750 Rx 825.750
Channel 16 (4) Tx 870.120 Rx 825.120

Cell # 16

Channel 1 (318) Tx 879.540 Rx 834.540
Channel 2 (297) Tx 878.910 Rx 833.910
Channel 3 (276) Tx 878.280 Rx 833.280
Channel 4 (255) Tx 877.650 Rx 832.650
Channel 5 (234) Tx 877.020 Rx 832.020
Channel 6 (213) Tx 876.390 Rx 831.390
Channel 7 (192) Tx 875.760 Rx 830.760
Channel 8 (171) Tx 875.130 Rx 830.130
Channel 9 (150) Tx 874.500 Rx 829.500
Channel 10 (129) Tx 873.870 Rx 828.870
Channel 11 (108) Tx 873.240 Rx 828.240
Channel 12 (87) Tx 872.610 Rx 827.610
Channel 13 (66) Tx 871.980 Rx 826.980
Channel 14 (45) Tx 871.350 Rx 826.350
Channel 15 (24) Tx 870.720 Rx 825.720
Channel 16 (3) Tx 870.090 Rx 825.090

Cell # 17

Channel 1 (317) Tx 879.510 Rx 834.510
Channel 2 (296) Tx 878.880 Rx 833.880
Channel 3 (275) Tx 878.250 Rx 833.250
Channel 4 (254) Tx 877.620 Rx 832.620
Channel 5 (233) Tx 876.990 Rx 831.990
Channel 6 (212) Tx 876.360 Rx 831.360
Channel 7 (191) Tx 875.730 Rx 830.730
Channel 8 (170) Tx 875.100 Rx 830.100
Channel 9 (149) Tx 874.470 Rx 829.470
Channel 10 (128) Tx 873.840 Rx 828.840
Channel 11 (107) Tx 873.210 Rx 828.210
Channel 12 (86) Tx 872.580 Rx 827.580
Channel 13 (65) Tx 871.950 Rx 826.950
Channel 14 (44) Tx 871.320 Rx 826.320
Channel 15 (23) Tx 870.690 Rx 825.690
Channel 16 (2) Tx 870.060 Rx 825.060

Cell # 18

Channel 1 (316) Tx 879.480 Rx 834.480
Channel 2 (295) Tx 878.850 Rx 833.850
Channel 3 (274) Tx 878.220 Rx 833.220
Channel 4 (253) Tx 877.590 Rx 832.590
Channel 5 (232) Tx 876.960 Rx 831.960
Channel 6 (211) Tx 876.330 Rx 831.330
Channel 7 (190) Tx 875.700 Rx 830.700
Channel 8 (169) Tx 875.070 Rx 830.070
Channel 9 (148) Tx 874.440 Rx 829.440
Channel 10 (127) Tx 873.810 Rx 828.810
Channel 11 (106) Tx 873.180 Rx 828.180
Channel 12 (85) Tx 872.550 Rx 827.550
Channel 13 (64) Tx 871.920 Rx 826.920
Channel 14 (43) Tx 871.290 Rx 826.290
Channel 15 (22) Tx 870.660 Rx 825.660
Channel 16 (1) Tx 870.030 Rx 825.030

Cell # 19

Channel 1 (315) Tx 879.450 Rx 834.450
Channel 2 (294) Tx 878.820 Rx 833.820
Channel 3 (273) Tx 878.190 Rx 833.190
Channel 4 (252) Tx 877.560 Rx 832.560
Channel 5 (231) Tx 876.930 Rx 831.930
Channel 6 (210) Tx 876.300 Rx 831.300
Channel 7 (189) Tx 875.670 Rx 830.670
Channel 8 (168) Tx 875.040 Rx 830.040
Channel 9 (147) Tx 874.410 Rx 829.410
Channel 10 (126) Tx 873.780 Rx 828.780
Channel 11 (105) Tx 873.150 Rx 828.150
Channel 12 (84) Tx 872.520 Rx 827.520
Channel 13 (63) Tx 871.890 Rx 826.890
Channel 14 (42) Tx 871.260 Rx 826.260
Channel 15 (21) Tx 870.630 Rx 825.630

Cell # 20

Channel 1 (314) Tx 879.420 Rx 834.420
Channel 2 (293) Tx 878.790 Rx 833.790
Channel 3 (272) Tx 878.160 Rx 833.160
Channel 4 (251) Tx 877.530 Rx 832.530
Channel 5 (230) Tx 876.900 Rx 831.900
Channel 6 (209) Tx 876.270 Rx 831.270
Channel 7 (188) Tx 875.640 Rx 830.640
Channel 8 (167) Tx 875.010 Rx 830.010
Channel 9 (146) Tx 874.380 Rx 829.380
Channel 10 (125) Tx 873.750 Rx 828.750
Channel 11 (104) Tx 873.120 Rx 828.120
Channel 12 (83) Tx 872.490 Rx 827.490
Channel 13 (62) Tx 871.860 Rx 826.860
Channel 14 (41) Tx 871.230 Rx 826.230
Channel 15 (20) Tx 870.600 Rx 825.600

Cell # 21

Channel 1 (313) Tx 879.390 Rx 834.390
Channel 2 (292) Tx 878.760 Rx 833.760
Channel 3 (271) Tx 878.130 Rx 833.130
Channel 4 (250) Tx 877.500 Rx 832.500
Channel 5 (229) Tx 876.870 Rx 831.870
Channel 6 (208) Tx 876.240 Rx 831.240
Channel 7 (187) Tx 875.610 Rx 830.610
Channel 8 (166) Tx 874.980 Rx 829.980
Channel 9 (145) Tx 874.350 Rx 829.350
Channel 10 (124) Tx 873.720 Rx 828.720
Channel 11 (103) Tx 873.090 Rx 828.090
Channel 12 (82) Tx 872.460 Rx 827.460
Channel 13 (61) Tx 871.830 Rx 826.830
Channel 14 (40) Tx 871.200 Rx 826.200
Channel 15 (19) Tx 870.570 Rx 825.570

Cellular Phone Band B
(Channel 1 is Data)

Cell # 1

Channel 1 (334) Tx 880.020 Rx 835.020
Channel 2 (355) Tx 880.650 Rx 835.650
Channel 3 (376) Tx 881.280 Rx 836.280
Channel 4 (397) Tx 881.910 Rx 836.910
Channel 5 (418) Tx 882.540 Rx 837.540
Channel 6 (439) Tx 883.170 Rx 838.170
Channel 7 (460) Tx 883.800 Rx 838.800
Channel 8 (481) Tx 884.430 Rx 839.430
Channel 9 (502) Tx 885.060 Rx 840.060
Channel 10 (523) Tx 885.690 Rx 840.690
Channel 11 (544) Tx 886.320 Rx 841.320
Channel 12 (565) Tx 886.950 Rx 841.950
Channel 13 (586) Tx 887.580 Rx 842.580
Channel 14 (607) Tx 888.210 Rx 843.210
Channel 15 (628) Tx 888.840 Rx 843.840
Channel 16 (649) Tx 889.470 Rx 844.470

Cell # 2

Channel 1 (335) Tx 880.050 Rx 835.050
Channel 2 (356) Tx 880.680 Rx 835.680
Channel 3 (377) Tx 881.310 Rx 836.310
Channel 4 (398) Tx 881.940 Rx 836.940
Channel 5 (419) Tx 882.570 Rx 837.570
Channel 6 (440) Tx 883.200 Rx 838.200
Channel 7 (461) Tx 883.830 Rx 838.830
Channel 8 (482) Tx 884.460 Rx 839.460
Channel 9 (503) Tx 885.090 Rx 840.090
Channel 10 (524) Tx 885.720 Rx 840.720
Channel 11 (545) Tx 886.350 Rx 841.350
Channel 12 (566) Tx 886.980 Rx 841.980
Channel 13 (587) Tx 887.610 Rx 842.610
Channel 14 (608) Tx 888.240 Rx 843.240
Channel 15 (629) Tx 888.870 Rx 843.870
Channel 16 (650) Tx 889.500 Rx 844.500

Cell # 3

Channel 1 (336) Tx 880.080 Rx 835.080
Channel 2 (357) Tx 880.710 Rx 835.710
Channel 3 (378) Tx 881.340 Rx 836.340
Channel 4 (399) Tx 881.970 Rx 836.970
Channel 5 (420) Tx 882.600 Rx 837.600
Channel 6 (441) Tx 883.230 Rx 838.230
Channel 7 (462) Tx 883.860 Rx 838.860
Channel 8 (483) Tx 884.490 Rx 839.490
Channel 9 (504) Tx 885.120 Rx 840.120
Channel 10 (525) Tx 885.750 Rx 840.750
Channel 11 (546) Tx 886.380 Rx 841.380
Channel 12 (567) Tx 887.010 Rx 842.010
Channel 13 (588) Tx 887.640 Rx 842.640
Channel 14 (609) Tx 888.270 Rx 843.270
Channel 15 (630) Tx 888.900 Rx 843.900
Channel 16 (651) Tx 889.530 Rx 844.530

Cell # 4

Channel 1 (337) Tx 880.110 Rx 835.110
Channel 2 (358) Tx 880.740 Rx 835.740
Channel 3 (379) Tx 881.370 Rx 836.370
Channel 4 (400) Tx 882.000 Rx 837.000
Channel 5 (421) Tx 882.630 Rx 837.630
Channel 6 (442) Tx 883.260 Rx 838.260
Channel 7 (463) Tx 883.890 Rx 838.890
Channel 8 (484) Tx 884.520 Rx 839.520
Channel 9 (505) Tx 885.150 Rx 840.150
Channel 10 (526) Tx 885.780 Rx 840.780
Channel 11 (547) Tx 886.410 Rx 841.410
Channel 12 (568) Tx 887.040 Rx 842.040
Channel 13 (589) Tx 887.670 Rx 842.670
Channel 14 (610) Tx 888.300 Rx 843.300
Channel 15 (631) Tx 888.930 Rx 843.930
Channel 16 (652) Tx 889.560 Rx 844.560

Cell # 5

Channel 1 (338) Tx 880.140 Rx 835.140
Channel 2 (359) Tx 880.770 Rx 835.770
Channel 3 (380) Tx 881.400 Rx 836.400
Channel 4 (401) Tx 882.030 Rx 837.030
Channel 5 (422) Tx 882.660 Rx 837.660
Channel 6 (443) Tx 883.290 Rx 838.290
Channel 7 (464) Tx 883.920 Rx 838.920
Channel 8 (485) Tx 884.550 Rx 839.550
Channel 9 (506) Tx 885.180 Rx 840.180
Channel 10 (527) Tx 885.810 Rx 840.810

Channel 11 (548) Tx 886.440 Rx 841.440
Channel 12 (569) Tx 887.070 Rx 842.070
Channel 13 (590) Tx 887.700 Rx 842.700
Channel 14 (611) Tx 888.330 Rx 843.330
Channel 15 (632) Tx 888.960 Rx 843.960
Channel 16 (653) Tx 889.590 Rx 844.590

Cell # 6

Channel 1 (339) Tx 880.170 Rx 835.170
Channel 2 (360) Tx 880.800 Rx 835.800
Channel 3 (381) Tx 881.430 Rx 836.430
Channel 4 (402) Tx 882.060 Rx 837.060
Channel 5 (423) Tx 882.690 Rx 837.690
Channel 6 (444) Tx 883.320 Rx 838.320
Channel 7 (465) Tx 883.950 Rx 838.950
Channel 8 (486) Tx 884.580 Rx 839.580
Channel 9 (507) Tx 885.210 Rx 840.210
Channel 10 (528) Tx 885.840 Rx 840.840
Channel 11 (549) Tx 886.470 Rx 841.470
Channel 12 (570) Tx 887.100 Rx 842.100
Channel 13 (591) Tx 887.730 Rx 842.730
Channel 14 (612) Tx 888.360 Rx 843.360
Channel 15 (633) Tx 888.990 Rx 843.990
Channel 16 (654) Tx 889.620 Rx 844.620

Cell # 7

Channel 1 (340) Tx 880.200 Rx 835.200
Channel 2 (361) Tx 880.830 Rx 835.830
Channel 3 (382) Tx 881.460 Rx 836.460
Channel 4 (403) Tx 882.090 Rx 837.090
Channel 5 (424) Tx 882.720 Rx 837.720
Channel 6 (445) Tx 883.350 Rx 838.350
Channel 7 (466) Tx 883.980 Rx 838.980
Channel 8 (487) Tx 884.610 Rx 839.610
Channel 9 (508) Tx 885.240 Rx 840.240
Channel 10 (529) Tx 885.870 Rx 840.870
Channel 11 (550) Tx 886.500 Rx 841.500
Channel 12 (571) Tx 887.130 Rx 842.130
Channel 13 (592) Tx 887.760 Rx 842.760
Channel 14 (613) Tx 888.390 Rx 843.390
Channel 15 (634) Tx 889.020 Rx 844.020
Channel 16 (655) Tx 889.650 Rx 844.650

Cell # 8

Channel 1 (341) Tx 880.230 Rx 835.230
Channel 2 (362) Tx 880.860 Rx 835.860
Channel 3 (383) Tx 881.490 Rx 836.490
Channel 4 (404) Tx 882.120 Rx 837.120
Channel 5 (425) Tx 882.750 Rx 837.750
Channel 6 (446) Tx 883.380 Rx 838.380
Channel 7 (467) Tx 884.010 Rx 839.010
Channel 8 (488) Tx 884.640 Rx 839.640
Channel 9 (509) Tx 885.270 Rx 840.270
Channel 10 (530) Tx 885.900 Rx 840.900
Channel 11 (551) Tx 886.530 Rx 841.530
Channel 12 (572) Tx 887.160 Rx 842.160
Channel 13 (593) Tx 887.790 Rx 842.790
Channel 14 (614) Tx 888.420 Rx 843.420
Channel 15 (635) Tx 889.050 Rx 844.050
Channel 16 (656) Tx 889.680 Rx 844.680

Cell # 9

Channel 1 (342) Tx 880.260 Rx 835.260
Channel 2 (363) Tx 880.890 Rx 835.890
Channel 3 (384) Tx 881.520 Rx 836.520
Channel 4 (405) Tx 882.150 Rx 837.150
Channel 5 (426) Tx 882.780 Rx 837.780
Channel 6 (447) Tx 883.410 Rx 838.410
Channel 7 (468) Tx 884.040 Rx 839.040
Channel 8 (489) Tx 884.670 Rx 839.670
Channel 9 (510) Tx 885.300 Rx 840.300
Channel 10 (531) Tx 885.930 Rx 840.930
Channel 11 (552) Tx 886.560 Rx 841.560
Channel 12 (573) Tx 887.190 Rx 842.190
Channel 13 (594) Tx 887.820 Rx 842.820
Channel 14 (615) Tx 888.450 Rx 843.450
Channel 15 (636) Tx 889.080 Rx 844.080
Channel 16 (657) Tx 889.710 Rx 844.710

Cell # 10

Channel 1 (343) Tx 880.290 Rx 835.290
Channel 2 (364) Tx 880.920 Rx 835.920
Channel 3 (385) Tx 881.550 Rx 836.550
Channel 4 (406) Tx 882.180 Rx 837.180
Channel 5 (427) Tx 882.810 Rx 837.810
Channel 6 (448) Tx 883.440 Rx 838.440
Channel 7 (469) Tx 884.070 Rx 839.070
Channel 8 (490) Tx 884.700 Rx 839.700
Channel 9 (511) Tx 885.330 Rx 840.330
Channel 10 (532) Tx 885.960 Rx 840.960
Channel 11 (553) Tx 886.590 Rx 841.590
Channel 12 (574) Tx 887.220 Rx 842.220
Channel 13 (595) Tx 887.850 Rx 842.850
Channel 14 (616) Tx 888.480 Rx 843.480
Channel 15 (637) Tx 889.110 Rx 844.110
Channel 16 (658) Tx 889.740 Rx 844.740

Cell # 11

Channel 1 (344) Tx 880.320 Rx 835.320
Channel 2 (365) Tx 880.950 Rx 835.950
Channel 3 (386) Tx 881.580 Rx 836.580
Channel 4 (407) Tx 882.210 Rx 837.210
Channel 5 (428) Tx 882.840 Rx 837.840
Channel 6 (449) Tx 883.470 Rx 838.470
Channel 7 (470) Tx 884.100 Rx 839.100
Channel 8 (491) Tx 884.730 Rx 839.730
Channel 9 (512) Tx 885.360 Rx 840.360
Channel 10 (533) Tx 885.990 Rx 840.990
Channel 11 (554) Tx 886.620 Rx 841.620
Channel 12 (575) Tx 887.250 Rx 842.250
Channel 13 (596) Tx 887.880 Rx 842.880
Channel 14 (617) Tx 888.510 Rx 843.510
Channel 15 (638) Tx 889.140 Rx 844.140
Channel 16 (659) Tx 889.770 Rx 844.770

Cell # 12

Channel 1 (345) Tx 880.350 Rx 835.350
Channel 2 (366) Tx 880.980 Rx 835.980
Channel 3 (387) Tx 881.610 Rx 836.610
Channel 4 (408) Tx 882.240 Rx 837.240
Channel 5 (429) Tx 882.870 Rx 837.870
Channel 6 (450) Tx 883.500 Rx 838.500
Channel 7 (471) Tx 884.130 Rx 839.130
Channel 8 (492) Tx 884.760 Rx 839.760
Channel 9 (513) Tx 885.390 Rx 840.390
Channel 10 (534) Tx 886.020 Rx 841.020
Channel 11 (555) Tx 886.650 Rx 841.650
Channel 12 (576) Tx 887.280 Rx 842.280
Channel 13 (597) Tx 887.910 Rx 842.910
Channel 14 (618) Tx 888.540 Rx 843.540
Channel 15 (639) Tx 889.170 Rx 844.170
Channel 16 (660) Tx 889.800 Rx 844.800

Cell # 13

Channel 1 (346) Tx 880.380 Rx 835.380
Channel 2 (367) Tx 881.010 Rx 836.010
Channel 3 (388) Tx 881.640 Rx 836.640
Channel 4 (409) Tx 882.270 Rx 837.270
Channel 5 (430) Tx 882.900 Rx 837.900
Channel 6 (451) Tx 883.530 Rx 838.530
Channel 7 (472) Tx 884.160 Rx 839.160
Channel 8 (493) Tx 884.790 Rx 839.790
Channel 9 (514) Tx 885.420 Rx 840.420
Channel 10 (535) Tx 886.050 Rx 841.050
Channel 11 (556) Tx 886.680 Rx 841.680
Channel 12 (577) Tx 887.310 Rx 842.310
Channel 13 (598) Tx 887.940 Rx 842.940
Channel 14 (619) Tx 888.570 Rx 843.570
Channel 15 (640) Tx 889.200 Rx 844.200
Channel 16 (661) Tx 889.830 Rx 844.830

Cell # 14

Channel 1 (347) Tx 880.410 Rx 835.410
Channel 2 (368) Tx 881.040 Rx 836.040
Channel 3 (389) Tx 881.670 Rx 836.670
Channel 4 (410) Tx 882.300 Rx 837.300
Channel 5 (431) Tx 882.930 Rx 837.930
Channel 6 (452) Tx 883.560 Rx 838.560
Channel 7 (473) Tx 884.190 Rx 839.190
Channel 8 (494) Tx 884.820 Rx 839.820
Channel 9 (515) Tx 885.450 Rx 840.450
Channel 10 (536) Tx 886.080 Rx 841.080
Channel 11 (557) Tx 886.710 Rx 841.710
Channel 12 (578) Tx 887.340 Rx 842.340
Channel 13 (599) Tx 887.970 Rx 842.970
Channel 14 (620) Tx 888.600 Rx 843.600
Channel 15 (641) Tx 889.230 Rx 844.230
Channel 16 (662) Tx 889.860 Rx 844.860

Cell # 15

Channel 1 (348) Tx 880.440 Rx 835.440
Channel 2 (369) Tx 881.070 Rx 836.070
Channel 3 (390) Tx 881.700 Rx 836.700
Channel 4 (411) Tx 882.330 Rx 837.330
Channel 5 (432) Tx 882.960 Rx 837.960
Channel 6 (453) Tx 883.590 Rx 838.590
Channel 7 (474) Tx 884.220 Rx 839.220
Channel 8 (495) Tx 884.850 Rx 839.850
Channel 9 (516) Tx 885.480 Rx 840.480
Channel 10 (537) Tx 886.110 Rx 841.110
Channel 11 (558) Tx 886.740 Rx 841.740
Channel 12 (579) Tx 887.370 Rx 842.370
Channel 13 (600) Tx 888.000 Rx 843.000
Channel 14 (621) Tx 888.630 Rx 843.630
Channel 15 (642) Tx 889.260 Rx 844.260
Channel 16 (663) Tx 889.890 Rx 844.890

Cell # 16

Channel 1 (349) Tx 880.470 Rx 835.470
Channel 2 (370) Tx 881.100 Rx 836.100
Channel 3 (391) Tx 881.730 Rx 836.730
Channel 4 (412) Tx 882.360 Rx 837.360
Channel 5 (433) Tx 882.990 Rx 837.990
Channel 6 (454) Tx 883.620 Rx 838.620
Channel 7 (475) Tx 884.250 Rx 839.250
Channel 8 (496) Tx 884.880 Rx 839.880
Channel 9 (517) Tx 885.510 Rx 840.510
Channel 10 (538) Tx 886.140 Rx 841.140
Channel 11 (559) Tx 886.770 Rx 841.770
Channel 12 (580) Tx 887.400 Rx 842.400
Channel 13 (601) Tx 888.030 Rx 843.030
Channel 14 (622) Tx 888.660 Rx 843.660
Channel 15 (643) Tx 889.290 Rx 844.290
Channel 16 (664) Tx 889.920 Rx 844.920

Cell # 17

Channel 1 (350) Tx 880.500 Rx 835.500
Channel 2 (371) Tx 881.130 Rx 836.130
Channel 3 (392) Tx 881.760 Rx 836.760
Channel 4 (413) Tx 882.390 Rx 837.390
Channel 5 (434) Tx 883.020 Rx 838.020
Channel 6 (455) Tx 883.650 Rx 838.650
Channel 7 (476) Tx 884.280 Rx 839.280
Channel 8 (497) Tx 884.910 Rx 839.910
Channel 9 (518) Tx 885.540 Rx 840.540
Channel 10 (539) Tx 886.170 Rx 841.170
Channel 11 (560) Tx 886.800 Rx 841.800
Channel 12 (581) Tx 887.430 Rx 842.430
Channel 13 (602) Tx 888.060 Rx 843.060
Channel 14 (623) Tx 888.690 Rx 843.690
Channel 15 (644) Tx 889.320 Rx 844.320
Channel 16 (665) Tx 889.950 Rx 844.950

Cell # 18

Channel 1 (351) Tx 880.530 Rx 835.530
Channel 2 (372) Tx 881.160 Rx 836.160
Channel 3 (393) Tx 881.790 Rx 836.790
Channel 4 (414) Tx 882.420 Rx 837.420
Channel 5 (435) Tx 883.050 Rx 838.050
Channel 6 (456) Tx 883.680 Rx 838.680
Channel 7 (477) Tx 884.310 Rx 839.310

Channel 8 (498) Tx 884.940 Rx 839.940
Channel 9 (519) Tx 885.570 Rx 840.570
Channel 10 (540) Tx 886.200 Rx 841.200
Channel 11 (561) Tx 886.830 Rx 841.830
Channel 12 (582) Tx 887.460 Rx 842.460
Channel 13 (603) Tx 888.090 Rx 843.090
Channel 14 (624) Tx 888.720 Rx 843.720
Channel 15 (645) Tx 889.350 Rx 844.350
Channel 16 (666) Tx 889.980 Rx 844.980

Cell # 19

Channel 1 (352) Tx 880.560 Rx 835.560
Channel 2 (373) Tx 881.190 Rx 836.190
Channel 3 (394) Tx 881.820 Rx 836.820
Channel 4 (415) Tx 882.450 Rx 837.450
Channel 5 (436) Tx 883.080 Rx 838.080
Channel 6 (457) Tx 883.710 Rx 838.710
Channel 7 (478) Tx 884.340 Rx 839.340
Channel 8 (499) Tx 884.970 Rx 839.970
Channel 9 (520) Tx 885.600 Rx 840.600
Channel 10 (541) Tx 886.230 Rx 841.230
Channel 11 (562) Tx 886.860 Rx 841.860
Channel 12 (583) Tx 887.490 Rx 842.490
Channel 13 (604) Tx 888.120 Rx 843.120
Channel 14 (625) Tx 888.750 Rx 843.750
Channel 15 (646) Tx 889.380 Rx 844.380

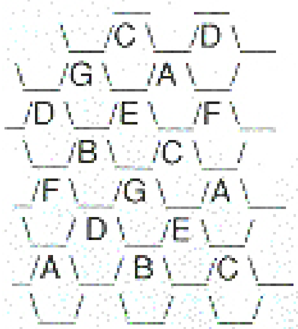
Cell # 20

Channel 1 (353) Tx 880.590 Rx 835.590
Channel 2 (374) Tx 881.220 Rx 836.220
Channel 3 (395) Tx 881.850 Rx 836.850
Channel 4 (416) Tx 882.480 Rx 837.480
Channel 5 (437) Tx 883.110 Rx 838.110
Channel 6 (458) Tx 883.740 Rx 838.740
Channel 7 (479) Tx 884.370 Rx 839.370
Channel 8 (500) Tx 885.000 Rx 840.000
Channel 9 (521) Tx 885.630 Rx 840.630
Channel 10 (542) Tx 886.260 Rx 841.260
Channel 11 (563) Tx 886.890 Rx 841.890
Channel 12 (584) Tx 887.520 Rx 842.520
Channel 13 (605) Tx 888.150 Rx 843.150
Channel 14 (626) Tx 888.780 Rx 843.780
Channel 15 (647) Tx 889.410 Rx 844.410

Cell # 21

Channel 1 (354) Tx 880.620 Rx 835.620
Channel 2 (375) Tx 881.250 Rx 836.250
Channel 3 (396) Tx 881.880 Rx 836.880
Channel 4 (417) Tx 882.510 Rx 837.510
Channel 5 (438) Tx 883.140 Rx 838.140
Channel 6 (459) Tx 883.770 Rx 838.770
Channel 7 (480) Tx 884.400 Rx 839.400
Channel 8 (501) Tx 885.030 Rx 840.030
Channel 9 (522) Tx 885.660 Rx 840.660
Channel 10 (543) Tx 886.290 Rx 841.290
Channel 11 (564) Tx 886.920 Rx 841.920
Channel 12 (585) Tx 887.550 Rx 842.550
Channel 13 (606) Tx 888.180 Rx 843.180
Channel 14 (627) Tx 888.810 Rx 843.810
Channel 15 (648) Tx 889.440 Rx 844.440

Cellular Phone Frequency and Cell Construction



This represents how a cellular system might be laid out. Cells A and B never share a common border. Neither do B and C, A and G, etc. Cells that are next to each other are never assigned adjacent frequencies. They always differ by at least 60 kiloHertz. To track a mobile phone as it changes cells, do the following. Let's put the mobile in a B cell. When the mobile switches frequencies, you know that he could only go to a D, E, F, or G cell because A and C have adjacent frequencies. The two tables below will help you determine which channel cells can go next to each other. You can contact your local cellular phone company and see if they have any maps of the cells available. This is not a sure thing, but it couldn't hurt to try.

Cells that can go next to each other:

Cell	Compatible cells
A	C, D, E, F
B	D, E, F, G
C	E, F, G, A
D	F, G, A, B
E	G, A, B, C
F	A, B, C, D
G	B, C, D, E

Here is a frequency/cell layout chart. The cell frequencies are used by the cell site towers, and the mobile frequencies are the input frequencies used by the cars.

WIRELINE COMPANY CELL FREQUENCIES (BAND B)

Voice Channels

A	B	C	D	E	F	G
889.890	889.920	889.950	889.980			
889.680	889.710	889.740	889.770	889.800	889.830	889.860
889.470	889.500	889.530	889.560	889.590	889.620	889.650
889.260	889.290	889.320	889.350	889.380	889.410	889.440
889.050	889.080	889.110	889.140	889.170	889.200	889.230
888.840	888.870	888.900	888.930	888.960	888.990	889.020
888.630	888.660	888.690	888.720	888.750	888.780	888.810
888.420	888.450	888.480	888.510	888.540	888.570	888.600
888.210	888.240	888.270	888.300	888.330	888.360	888.390
888.000	888.030	888.060	888.090	888.120	888.150	888.180
887.790	887.820	887.850	887.880	887.910	887.940	887.970
887.580	887.610	887.640	887.670	887.700	887.730	887.760
887.370	887.400	887.430	887.460	887.490	887.520	887.550
887.160	887.190	887.220	887.250	887.280	887.310	887.340
886.950	886.980	887.010	887.040	887.070	887.100	887.130
886.740	886.770	886.800	886.830	886.860	886.890	886.920
886.530	886.560	886.590	886.620	886.650	886.680	886.710
886.320	886.350	886.380	886.410	886.440	886.470	886.500
886.110	886.140	886.170	886.200	886.230	886.260	886.290
885.900	885.930	885.960	885.990	886.020	886.050	886.080
885.690	885.720	885.750	885.780	885.810	885.840	885.870
885.480	885.510	885.540	885.570	885.600	885.630	885.660
885.270	885.300	885.330	885.360	885.390	885.420	885.450
885.060	885.090	885.120	885.150	885.180	885.210	885.240
884.850	884.880	884.910	884.940	884.970	885.000	885.030
884.640	884.670	884.700	884.730	884.760	884.790	884.820
884.430	884.460	884.490	884.520	884.550	884.580	884.610
884.220	884.250	884.280	884.310	884.340	884.370	884.400
884.010	884.040	884.070	884.100	884.130	884.160	884.190
883.800	883.830	883.860	883.890	883.920	883.950	883.980
883.590	883.620	883.650	883.680	883.710	883.740	883.770
883.380	883.410	883.440	883.470	883.500	883.530	883.560
883.170	883.200	883.230	883.260	883.290	883.320	883.350
882.960	882.990	883.020	883.050	883.080	883.110	883.140
882.750	882.780	882.810	882.840	882.870	882.900	882.930
882.540	882.570	882.600	882.630	882.660	882.690	882.720
882.330	882.360	882.390	882.420	882.450	882.480	882.510
882.120	882.150	882.180	882.210	882.240	882.270	882.300
881.910	881.940	881.970	882.000	882.030	882.060	882.090
881.700	881.730	881.760	881.790	881.820	881.850	881.880
881.490	881.520	881.550	881.580	881.610	881.640	881.670
881.280	881.310	881.340	881.370	881.400	881.430	881.460
881.070	881.100	881.130	881.160	881.190	881.220	881.250
880.860	880.890	880.920	880.950	880.980	881.010	881.040
880.650	880.680	880.710	880.740	880.770	880.800	880.830

Digital Control Channels

880.440	880.470	880.500	880.530	880.560	880.590	880.620
880.230	880.260	880.290	880.320	880.350	880.380	880.410
880.020	880.050	880.080	880.110	880.140	880.170	880.200

WIRELINE COMPANY MOBILE FREQUENCIES (BAND B)

Voice Channels

844.890	844.920	844.950	844.980			
844.680	844.710	844.740	844.770	844.800	844.830	844.860
844.470	844.500	844.530	844.560	844.590	844.620	844.650
844.260	844.290	844.320	844.350	844.380	844.410	844.440
844.050	844.080	844.110	844.140	844.170	844.200	844.230
843.840	843.870	843.900	843.930	843.960	843.990	844.020
843.630	843.660	843.690	843.720	843.750	843.780	843.810
843.420	843.450	843.480	843.510	843.540	843.570	843.600
843.210	843.240	843.270	843.300	843.330	843.360	843.390
843.000	843.030	843.060	843.090	843.120	843.150	843.180
842.790	842.820	842.850	842.880	842.910	842.940	842.970
842.580	842.610	842.640	842.670	842.700	842.730	842.760
842.370	842.400	842.430	842.460	842.490	842.520	842.550
842.160	842.190	842.220	842.250	842.280	842.310	842.340
841.950	841.980	842.010	842.040	842.070	842.100	842.130
841.740	841.770	841.800	841.830	841.860	841.890	841.920
841.530	841.560	841.590	841.620	841.650	841.680	841.710
841.320	841.350	841.380	841.410	841.440	841.470	841.500
841.110	841.140	841.170	841.200	841.230	841.260	841.290
840.900	840.930	840.960	840.990	841.020	841.050	841.080
840.690	840.720	840.750	840.780	840.810	840.840	840.870
840.480	840.510	840.540	840.570	840.600	840.630	840.660
840.270	840.300	840.330	840.360	840.390	840.420	840.450
840.060	840.090	840.120	840.150	840.180	840.210	840.240
839.850	839.880	839.910	839.940	839.970	840.000	840.030
839.640	839.670	839.700	839.730	839.760	839.790	839.820
839.430	839.460	839.490	839.520	839.550	839.580	839.610
839.220	839.250	839.280	839.310	839.340	839.370	839.400
839.010	839.040	839.070	839.100	839.130	839.160	839.190
838.800	838.830	838.860	838.890	838.920	838.950	838.980
838.590	838.620	838.650	838.680	838.710	838.740	838.770
838.380	838.410	838.440	838.470	838.500	838.530	838.560
838.170	838.200	838.230	838.260	838.290	838.320	838.350
837.960	837.990	838.020	838.050	838.080	838.110	838.140
837.750	837.780	837.810	837.840	837.870	837.900	837.930
837.540	837.570	837.600	837.630	837.660	837.690	837.720
837.330	837.360	837.390	837.420	837.450	837.480	837.510
837.120	837.150	837.180	837.210	837.240	837.270	837.300
836.910	836.940	836.970	837.000	837.030	837.060	837.090
836.700	836.730	836.760	836.790	836.820	836.850	836.880
836.490	836.520	836.550	836.580	836.610	836.640	836.670
836.280	836.310	836.340	836.370	836.400	836.430	836.460
836.070	836.100	836.130	836.160	836.190	836.220	836.250
835.860	835.890	835.920	835.950	835.980	836.010	836.040
835.650	835.680	835.710	835.740	835.770	835.800	835.830

Digital Control Channels

835.440	835.470	835.500	835.530	835.560	835.590	835.620
835.230	835.260	835.290	835.320	835.350	835.380	835.410
835.020	835.050	835.080	835.110	835.140	835.170	835.200

NON-WIRELINE COMPANY CELL FREQUENCIES (BAND A)

Digital Control Channels

879.900	879.930	879.960	879.990			
879.690	879.720	879.750	879.780	879.810	879.840	879.870
879.480	879.510	879.540	879.570	879.600	879.630	879.660
				879.390	879.420	879.450

Voice Channels

879.270	879.300	879.330	879.360			
879.060	879.090	879.120	879.150	879.180	879.210	879.240
878.850	878.880	878.910	878.940	878.970	879.000	879.030
878.640	878.670	878.700	878.730	878.760	878.790	878.820
878.430	878.460	878.490	878.520	878.550	878.580	878.610
878.220	878.250	878.280	878.310	878.340	878.370	878.400
878.010	878.040	878.070	878.100	878.130	878.160	878.190
877.800	877.830	877.860	877.890	877.920	877.950	877.980
877.590	877.620	877.650	877.680	877.710	877.740	877.770
877.380	877.410	877.440	877.470	877.500	877.530	877.560
877.170	877.200	877.230	877.260	877.290	877.320	877.350
876.960	876.990	877.020	877.050	877.080	877.110	877.140
876.750	876.780	876.810	876.840	876.870	876.900	876.930
876.540	876.570	876.600	876.630	876.660	876.690	876.720
876.330	876.360	876.390	876.420	876.450	876.480	876.510
876.120	876.150	876.180	876.210	876.240	876.270	876.300
875.910	875.940	875.970	876.000	876.030	876.060	876.090
875.700	875.730	875.760	875.790	875.820	875.850	875.880
875.490	875.520	875.550	875.580	875.610	875.640	875.670
875.280	875.310	875.340	875.370	875.400	875.430	875.460
875.070	875.100	875.130	875.160	875.190	875.220	875.250
874.860	874.890	874.920	874.950	874.980	875.010	875.040
874.650	874.680	874.710	874.740	874.770	874.800	874.830
874.440	874.470	874.500	874.530	874.560	874.590	874.620
874.230	874.260	874.290	874.320	874.350	874.380	874.410
874.020	874.050	874.080	874.110	874.140	874.170	874.200
873.810	873.840	873.870	873.900	873.930	873.960	873.990
873.600	873.630	873.660	873.690	873.720	873.750	873.780
873.390	873.420	873.450	873.480	873.510	873.540	873.570
873.180	873.210	873.240	873.270	873.300	873.330	873.360
872.970	873.000	873.030	873.060	873.090	873.120	873.150
872.760	872.790	872.820	872.850	872.880	872.910	872.940
872.550	872.580	872.610	872.640	872.670	872.700	872.730
872.340	872.370	872.400	872.430	872.460	872.490	872.520
872.130	872.160	872.190	872.220	872.250	872.280	872.310
871.920	871.950	871.980	872.010	872.040	872.070	872.100
871.710	871.740	871.770	871.800	871.830	871.860	871.890
871.500	871.530	871.560	871.590	871.620	871.650	871.680
871.290	871.320	871.350	871.380	871.410	871.440	871.470
871.080	871.110	871.140	871.170	871.200	871.230	871.260
870.870	870.900	870.930	870.960	870.990	871.020	871.050
870.660	870.690	870.720	870.750	870.780	870.810	870.840
870.450	870.480	870.510	870.540	870.570	870.600	870.630
870.240	870.270	870.300	870.330	870.360	870.390	870.420
870.030	870.060	870.090	870.120	870.150	870.180	870.210

NON-WIRELINE COMPANY MOBILE FREQUENCIES (BAND A)

Digital Control Channels

834.900	834.930	834.960	834.990			
834.690	834.720	834.750	834.780	834.810	834.840	834.870
834.480	834.510	834.540	834.570	834.600	834.630	834.660
				834.390	834.420	834.450

Voice Channels

834.270	834.300	834.330	834.360			
834.060	834.090	834.120	834.150	834.180	834.210	834.240
833.850	833.880	833.910	833.940	833.970	834.000	834.030
833.640	833.670	833.700	833.730	833.760	833.790	833.820
833.430	833.460	833.490	833.520	833.550	833.580	833.610
833.220	833.250	833.280	833.310	833.340	833.370	833.400
833.010	833.040	833.070	833.100	833.130	833.160	833.190
832.800	832.830	832.860	832.890	832.920	832.950	832.980
832.590	832.620	832.650	832.680	832.710	832.740	832.770
832.380	832.410	832.440	832.470	832.500	832.530	832.560
832.170	832.200	832.230	832.260	832.290	832.320	832.350
831.960	831.990	832.020	832.050	832.080	832.110	832.140
831.750	831.780	831.810	831.840	831.870	831.900	831.930
831.540	831.570	831.600	831.630	831.660	831.690	831.720
831.330	831.360	831.390	831.420	831.450	831.480	831.510
831.120	831.150	831.180	831.210	831.240	831.270	831.300
830.910	830.940	830.970	831.000	831.030	831.060	831.090
830.700	830.730	830.760	830.790	830.820	830.850	830.880
830.490	830.520	830.550	830.580	830.610	830.640	830.670
830.280	830.310	830.340	830.370	830.400	830.430	830.460
830.070	830.100	830.130	830.160	830.190	830.220	830.250
829.860	829.890	829.920	829.950	829.980	830.010	830.040
829.650	829.680	829.710	829.740	829.770	829.800	829.830
829.440	829.470	829.500	829.530	829.560	829.590	829.620
829.230	829.260	829.290	829.320	829.350	829.380	829.410
829.020	829.050	829.080	829.110	829.140	829.170	829.200
828.810	828.840	828.870	828.900	828.930	828.960	828.990
828.600	828.630	828.660	828.690	828.720	828.750	828.780
828.390	828.420	828.450	828.480	828.510	828.540	828.570
828.180	828.210	828.240	828.270	828.300	828.330	828.360
827.970	828.000	828.030	828.060	828.090	828.120	828.150
827.760	827.790	827.820	827.850	827.880	827.910	827.940

(continued on page 32)

TROUBLE IN THE WHITE HOUSE

by Charlie Zee

Tuesday, January 26, the White House phone number 456-1414 is busy. In fact, all the White House numbers seem to be busy. And so it's been for the past few days at the White House. There's no way to get through. Is there something wrong with the White House phones? No, said Robert Calhoun, assistant to Delano Lewis, president of C&P Telephone. "We checked on it yesterday. The actual equipment is working fine. There is just a tremendous amount of calls coming into the White House switchboard as well as the Capitol. It appears to me personally that this is something new. That people want to take an interest in their government. They want to speak to the president directly."

Perhaps. But this has been going on for days. Old-timers have never seen anything like it. There were some times during the Watergate stories that the lines would get busy, and the day after Reagan was shot. But hour after hour? Day after day? The White House phone system is designed to handle demands comparable to those of, say, Desert Storm. It has its own dedicated central-office-size switching center, said Michael Daley, a spokesman for C&P. The telephone company's normal central offices in Washington usually route traffic for dozens of blocks of office buildings.

As far as who's answering those many lines, the White House won't say. Alex Nagy, director of telephone services (called at the same number he had during the Bush administration), would not even come to the phone. His assistant said: "We do not give out any details."

However, one former White House staffer said there are perhaps a half dozen operators usually working at any one time. He said they "are the top of their profession and career civil servants."

It's definitely not business as usual at the White House according to Joel Garreau of the *Washington Post*. High and low officials throughout town, supplicants and power brokers, can't get through. At a key moment in the recent confirmation hearings for Attorney General-designate Zoe Baird, Senator Joseph Biden got so frustrated trying to get through to the president that he told aides if he didn't hear from Bill Clinton in five minutes, he was going out to the floor to flatly announce his opposition. That broke through the clutter. Somehow Clinton got back to him instantly.

Is it easier for the Russians? With the hot line and all? No, said embassy press counselor Vladimir Derbenev at 347-1347. The White House's direct connection is only to Moscow, not the embassy.

What about the Iraqis? How would they get through to the president? Fire a few rounds at the Kittyhawk? A hurried call to their embassy at 483-7500.... No, we have not been having any particular problem with the White House phones, came the answer. That's because we can't call the White House much. Our problem is with the United Nations.

And bypassing the White House switchboard and trying to reach somebody's direct line is no snap. Call the old number for the press office listed in the *National Journal's Capitol Source* directory, and the call is answered by the office of the chief of staff. Ask them if anybody is keeping track of how many incoming calls there have been, and you are directed to the staff secretariat. Ask who is the head of that, and the person at the office of the chief of staff does not know. There's no new White House phone directory out yet even for people inside the building. Track is being kept on the backs of envelopes; some numbers have changed. "We're working on hit-or-miss temporary listings. They're not complete," said one White House source.

On January 26, the telephonic gridlock had sloshed over into the Capitol Hill lines. The office of Senator Dan Coates (R-Ind.), a vocal opponent of Clinton's proposal to rescind the ban on homosexuals serving in the armed forces, numbers about 1,000 by Tuesday night - about 16 to 1 in favor of the ban, the Associated Press reported. The office of one prominent liberal senator said it received 500 to 700 calls, with a majority in favor of allowing homosexuals in the military, said an aide.

And the main Capitol Hill number, 224-3121, has remained busy. Could this all be people wound up in the gay issue? In fact, no, said one White House official when finally reached. "The switchboard is totally swamped, but the calls are running about 50-50," said the source. "Half concern the issue of gays in the military. But the other half is people who are perceiving waffles on campaign pledges. Clinton promised many things. And now people are worried that things are not going to turn out that way. People are more involved with this administration than in the past. Even the [mechanized] comment line has never been like this. Everybody and their brother feels like they can call in, and right now, they are."

Then again, some of those calls are like the ones made to David Watkins. If anybody should know what's going on with the phones, he ought to be the one, seeing as how he's assistant to the president for the office of administration and management. And somebody had him listed at 456-6797.

That, in fact, turns out to be the office of the chief of staff, which could still make sense since that's who he works for, according to the table of organization handed out back in Little Rock. But no. The person who answered the phone at the office of the chief of staff said she did not have him on any of her lists. Nor did she know where he sat or what his phone number might be. In fact, she had never heard of him.

beige box construction

by The Phoenix

Many tasks involving phone line work (such as installing a new extension, etc.) are much easier when you have a lineman's handset. Since a typical tone/pulse switchable model sells for about $300 many people opt to build their own. Such an improvised handset is called a beige box. I will begin this article by repeating the instructions for making one. Next I will mention what the lineman's handset has that the generic box lacks and explain how to add these features.

To construct a basic beige box you need a one piece phone, preferably pulse/tone switchable, a pair of alligator clips (one red and one black for the traditional look), and some tools (wire cutters, wire strippers, long nose pliers, PVC electrical tape, and a soldering iron). If the phone has no line cord you will need that too. Cut the wire about four feet from the phone. Expose and strip the red and green wires. Connect the red alligator clip to the red wire and the black clip to the green wire. For a good connection these should be soldered. Wrap the connections in electrical tape. It's that simple! In the off-hook state this device will behave just like a lineman's handset in the Talk mode.

Lineman's handsets have a Talk/Monitor switch instead of a switchhook. In the Monitor mode it does not merely go on-hook like our beige box; it becomes a *line tap*. You can monitor everything which transpires on the line: an indispensible testing aid! If no phones are off-hook you will hear a background hum. If you pick up an extension you will hear the click and dial tone. It will not interfere with rotary dialing. If an incoming call arrives you hear the ringing signal (a loud purring).

To add this feature to your beige box you will need a .47 microfarad 250 V capacitor (non electrolytic), an audio matching transformer: eight ohms to 1000 ohms (Radio Shack Cat. #273-1380 will be used in the example), a DPDT switch, and some wire. Refer to Figure 1. Open the phone. Locate the point where the line cord enters. The red wire is the "ring" and is labeled "R" in the figure. The green ("tip") is labeled "T". Points "r" and "t" (lower case) are the points where these connect to the phone circuitry. Disconnect the Ring from the phone circuitry and connect it to the center of one pole of the switch. Run a line from one leg to the point where the Ring used to be. Connect the capacitor to the other leg. Solder the other capacitor lead to the transformer's blue lead. Connect the black lead to the tip. Ignore the green transformer lead (cut it off if it annoys you). The high impedance side is complete.

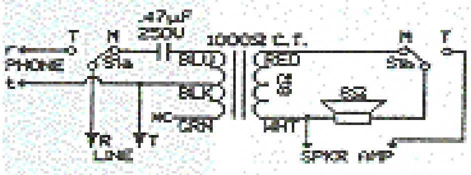


Fig. 1

Now the eight ohm side: Find the earphone leads. (If the colors give any clue as to polarity put the switch on the positive one.) Connect the white wire from the transformer to one of the speaker wires. Disconnect the other speaker wire from the main circuitry and solder it to the center of the free pole on the switch. Attach the red transformer lead to the leg on this pole which corresponds to the capacitor's position on the other pole, i.e. the Monitor position. The remaining switch terminal should be connected to the point from which the speaker wire was removed. With this modification the switchhook becomes somewhat pointless. The ringer can also be removed to make room for the transformer. Test the switch, mount it, and label T and M.

Many exciting new handsets of the tone/pulse switchable type have an extra switch: KEYPAD: IN/OUT. I assume this is to prevent accidentally dialing with your shoulder. This will not be discussed.

One last feature these new handsets have is a polarity test. This can be useful. Obtain one green and one red LED, an SPST momentary pushbutton, and a 1k ohm resistor. Refer to Figure 2. Connect the anode of the green LED to the cathode of the red one and to the resistor. Tie the cathode of the green to the anode of the red and connect that to the Tip. Connect the free end of the resistor to the button and the other side of the button to the Ring. Make sure that the cathode of the green is wired to the black alligator clip. When the button is pressed the green LED will light if the red clip is on the positive (+) and the black clip on the negative (-). Note: The polarity test will create an off-hook status.

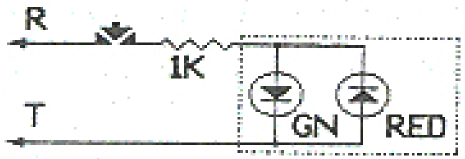


Fig. 2

Thanks go to The Exterminator and The Terminal Man for their text file, *Beige Box: Construction and Use* dated Friday 17 May 1985, which detailed the construction reiterated in paragraph two. The type of phone tap I employed in adding the monitor mode was first brought to my attention in a text file by The Phantom (title/date unavailable). Note that if your speaker is not eight ohm you will have to use a different transformer; check with the outfit you get your .47 microfarad capacitor from.

Lastly, Radio Shack no longer carries .47 microfarad capacitors. I wonder why? Other electronics distributors do. You may also find them in phone equipment isolating the ringer from the line.

DESCRAMBLING CABLE

by Dr. Clayton Phorester

If you were thinking about opening your cable box, don't! Most cable boxes have a small metal connector in the front right of the box. Once the lid is off, the connection is broken and a little battery inside remembers. I learned this the hard way with a Pioneer converter. Once the connection breaks, the little channel display on the box will go all screwy, and the only button that will work is the power button. If you *did* open the box, you would now notice that whenever you turn the TV on, it goes to a preset station and can't be changed. This station is usually the one that your box displays when you tune to a premium channel that you don't subscribe to. At any rate, cable companies will fine you around $25 to reactivate your box. And if they think you've tampered with it, that goes up to $1000 (according to California law). All the cable company has to do is press a few keys on their cheap computers in their cozy little offices to get the box at your house back on line. (And you thought their regular rates were bad!)

If you did open it, maybe you could tell them that it fell on the floor during an earthquake or something. Or, you could do what I did. I told my cable operator that I was throwing away a TV, and was going to return my cable box. Well, I returned the box (after I closed it back up, of course) and about a month later I told my cable company that I got a new TV. I went to the cable office and picked up a new box. Result: I got a perfectly good box, while some dumb Wilson got the old tampered- with one! And, of course, the Wilson won't know what the hell's going on when his box doesn't work, so he'll call the cable company and complain. The cable company (arrogant as they all are) will naturally assume that this person was trying to tamper with it, and they aren't gonna believe anything this guy is gonna tell them. *Ha! Ha! Ha!* (That's just my sick sense of humor.)

The point is: *don't open the damn box!* Inside there are a hundred little dials, screws, and thingamabobers, but messing with them won't do you a hell of a lot of good if the box won't respond to any commands in the first place!

I just recently downloaded from a local BBS the following instructions to make a cable descrambler. It appears to have been uploaded in 1988 (how's that for sysop incompetence?) but it's worth a shot anyway. I'm almost certain that it won't work with a handful of cable systems because every one is different in its own little perverse kind of way. In Step 6, the author assumes that you will be using a cable box. I don't think that having a box is a requirement, because I don't have one, and my descrambler works just fine. On my cable system, boxes are an option for old TV's that don't go any higher than Channel 13, and TV's that you want to receive premium channels. So if you have one or not, don't sweat it.

Enough talk! Whip out your wallet, your car keys, your soldering iron, and kick some cable company butt!

How To Build a Pay TV Descrambler

Author Unknown

Materials Required

1 Radio Shack mini-box (RS #270-235)

1 1/4 watt resistor, 2.2k-2.4k ohm (RS #271-1325)

1 75pf-100pf variable capacitor (hard to find)

2 F61a chassis-type coaxial connectors (RS #278-212)

12" No. 12 solid copper wire

12" RG59 coaxial cable

Instructions

1. Bare a length of No. 12 gauge solid copper wire and twist around a 3/8 inch nail or rod to form a coil of nine turns. Elongate coil to a length of 1 1/2 inches and form right angle bends on each end.

2. Solder the variable capacitor to the coil. It doesn't matter where you solder it; it still does the same job. The best place for it is in the center with the adjustment screw facing upward. Note: When it comes time to place coil in box, the coil must be grounded. This can be done by crazy-gluing a piece of rubber to the bottom of the box and securing the coil to it.

3. Tap coil at points 2 1/2 turns from ends of coil and solder to coaxial chassis connectors, bringing tap leads through holes in chassis box. Use as little wire as possible.

4. Solder resistor to center of coil and ground other end of resistor to chassis box, using solder lug and small screw.

5. Drill a 1/2 inch diameter hole in mini-box cover to permit adjustment of the variable capacitor from the outside.

6. Place device in line with existing cable on either side of the converter box and connect to a television set with the piece of RG59 coaxial cable. Set television to HBO channel.

7. Using a plastic screwdriver (or anything else non-metallic), adjust the variable capacitor until picture tunes in. Sit back, relax, and enjoy!

SJG TRIAL: DAY BY DAY

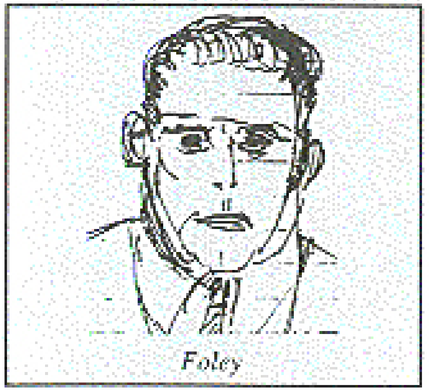
Secret Service on Trial

BY PACO XANDER NATHAN

Day One

DATELINE: January 26, 1993 - the beginning of three strange days of Federal District Court in Austin, Texas. A rare frost lays on the ground and chill air descends on the "birthplace of cyberpunk" as I ride down to Judge Sparks' courtroom. I have to check my stun at the X-ray desk - politely. Even then some big Federal Marshall goon pulls me out of a pretrial crowd to demand ID and lecture about "weapons in a courtroom". 'Tis a task performed with apprehension because today of all days, the Feds must take the stand - poised for a fall, as improbable as it may seem, at the hand of a mob of Freaks. "Computer Freaks." You can see it written in the eyes of each SS agent surrounding the court room. Today the Feds themselves are on trial; today They can no longer run and hide.

First we must wait for Judge Sparks to clear the docket. A jury deliberates its eventual "guilty" verdict on a guy who'd sent an 11-year-old in to conduct a bank heist, and Sparks prepares to send that guy on his third trip to camp. Outside the parties in our case pace fervently... Ed Cavazos, vice-president of EFF-Austin, recent UT/Austin Law School grad and a good friend, bounces off the walls in anticipation. This is Ed's first full case: he's been a sysop for years, runs a popular BBS in Austin called "Bamboo Gardens", and grabbed a lucky break by educating the local newspaper's high-tech law firm - George, Donaldson, and Ford - about the arcane ways of computing and BBS's. Shari Steele of the Electronic Frontier Foundation - major underwriter for the plaintiff's legal fees - works the field for her home office. Joe Abernathy of the *Houston Chronicle* and *Village Voice* - probably the first major newspaper columnist to cover computer underground issues on a regular basis - presses flesh in



Foley

an attempt to uncover dirt. Steve Jackson stands nervously, chatting, trying to maintain a good humor among plaintiff groupies which even includes his mom. A vague array of Fed spooks and lawyers crowd the courthouse shadows, avoiding all contact. Lawyers from both sides huddle and haggle in a last minute settlement procedure which dies when the SS claims they "lack enough budget" to cover Steve Jackson Games' legal fees. Well, we'll see, eh?

Sparks delays the trial until after lunch. I overhear SS agents' talk about restaurants, so I tail them and sit down at the next table *after* they order. They get up in disgust and move to the back of the restaurant.

"The Court calls the case of SJG et al. versus SS et al. to order..." Plaintiff, with lawyer Pete Kennedy at the helm, introduces witnesses: Steffan O'Sullivan, Elizabeth McCoy, and Walter Milliken - SJG writers and users of the seized *Illuminati BBS* who'd joined in the lawsuit as plaintiffs - along with Wayne Bell, developer of WWIV bulletin board software. Government defense introduces Larry Coutorie - famed UT Austin "computer cop" - and SS agents Tim Foley and Barbara Golden.

Timothy Michael Foley takes the stand under cross-examination. Loyola University '84 Law School grad, trial layer for 2+ years, lately of the US Secret Service - a good ole boy in any other life. Foley was the SS agent assigned to the "E911 Document" investigation and his sworn affidavit to Fed Magistrate Stephen Capelle early in 1990 lead to a search warrant for the SS raid on SJG. Foley rambles defensively about his computer expertise, brags of being top dog at SS Computer Fraud School, tells how he learned about "Social Engineering" there in mid-89, only months prior to the decision to raid SJG. Foley talks boldly of *Phrack* #24 and the Craig Neidorf case, sloppily explains BITNET to the judge, then mentions the *Phoenix Project* - a "suspected hacker BBS" operated in Austin by "The Mentor" (aka Loyd Blankenship) and "Eric Bloodaxe" (aka Chris Goggans), and thought by the SS in 1990 to contain secret areas for instruction on "computer crime". One of the sysops worked for SJG and therein lies the *only grounds* for the raid. However, under oath Foley admits that at the time of his affidavit to Capelle, he didn't have any info showing the E911 document ever even reached the *Illuminati BBS* and SJG. Moreover, Foley confesses he knew that "telecom expert Hank Kluepfel [who enters this grim picture later] had never logged into *Illuminati*." When asked about the allegedly threatening SJG project called *GURPS Cyberpunk*, Foley states: "I did not read through the game."

Not terribly incriminating so far, but enough to show that the SS had not made a full disclosure to Magistrate Capelle before obtaining a search warrant. Even so, never assume the Government is sleeping.

Up walks Mark Batten, a tall, slim, boyish-skinned assistant US Attorney. Batten *knows* computing, in fact he spends most of his off hours porting DOS games to the Macintosh ("I got a Mac in college and I've been doing that ever since" he tells me during break). Batten takes Foley off the hook by having him testify that the SS didn't teach about Federal statutes which limit seizure of equipment from publishers.

Next we get Officer Larry Coutorie on the stand. Coutorie has been with the UT Austin police for years, but lately seems to be working the computer crime beat. The SS search warrant against SJG claimed that Officer Coutorie had provided "UT locator information" about Loyd Blankenship and cited one of Coutorie's documents. Under oath, Coutorie denies the alleged snooping, since Blankenship was never affiliated with UT Austin nor in the school databases; Coutorie claims the document was printed *after* the SJG raid. Note that Officer Coutorie is technically "on the other side" from SJG, but in depositions he distanced himself from the Feds. Rumor has it that the Coutorie's lawyer's car sports a nifty EFF bumper sticker. Ladies and gentlemen, this marks a blow for the Feds. But wait, another SS agent - Barbara Golden from the Chicago area - takes the stand. Golden looks timid, indignant, fearful, like a third grade teacher surprised in a fire drill. She answers in fitful, nervous clips of "Yes" and "No". Golden - who conducted the SJG raid and computer equipment seizure - admits under oath that she "didn't know much about computers," claimed she "didn't know about search rules for publishers" but counters that Steve Jackson Games Inc. - the renowned publisher of role-playing game books - wasn't a publisher. Plaintiff calls for a videotape of the raid - recorded by the SS - to be entered as evidence. After several abortive attempts (Sparks jokes: "Let the record show that no one could successfully operate the VCR although there were several attempts by various lawyers") the video finally spins its eerie record of the early morning bust on March 1, 1990. Office walls show notes about printing schedules and halfway through somebody from SJG walks in aghast, shouting "We are a publisher!" Ignorance doesn't get much more blatant than this, and rumor has it the cyberpunk author/journalist Bruce Sterling will show a copy of the tape as a backdrop during his next lecture tour.

Steven Gary Jackson jumps into the hot seat next. Steve, who attended law school before becoming a gaming industry entrepreneur in 1980, understands the essence of this game and it shows. Over the course of the afternoon and the next morning, Steve's lawyers guide him through an extended testimony: the nature of role playing games (RPG)... creation of his *GURPS* system for role playing... origins of "cyberpunk" as a literary genre in novels such as 1984 and Neuromancer... intentions for the seized *GURPS Cyberpunk* to have been a literary survey. "That book was key to our company's financial well-being - distributors judge you on the basis of new product each month." Jackson goes on to describe the *Illuminati BBS*, how he didn't even know *why* it was seized by the Feds and therefore feared replacing it. "We tried hard to find out [why the BBS was seized]..." At one point near tears, Jackson explains what appears to be his main contention against the government: "After the raid, I saw my employees being upset... We couldn't see any way to stay in business without drastic cuts, so we laid off eight people out of 18... If the Secret Service had just come with a subpoena we could have

Golden

showed or copied every file in the building for them."

Steve closes the first day's testimony with an appalling account of trying to obtain copies of his seized disks - vital business records and publication drafts which were held for months with no explanation - from Agent Foley.

Foley (referring to GURPS Cyberpunk): "Do you realize you're publishing information on how to commit computer crime?"

Jackson: "This is a game."

Foley: "No, this is real."

Day Two

Defense counsel Mark Batten cross-examines Jackson in a cowardly attempt to imply that SJG was in financial trouble before the raid but recovered to profitability afterward. Judge Sparks interrupts: "Because it was raided by the Secret Service? Is the Government claiming they *helped* his business by seizing equipment?"

Batten counters with a conceptual right hook: "No, your Honor..." - then launches into a sordid tale about how the SJG game *Hacker* resulted from the raid, and how SJG capitalized on publicity surrounding the SS action. Defense tries to pin the issue on Steve:

Batten: "Why did you design Hacker?"

Jackson: "I was angry... I am a writer, this is the way I tell a story."

Elizabeth McCoy takes the stand next. As an interactive fiction writer for SJG, she'd been a board moderator on part of the seized *Illuminati BBS*. Elizabeth testifies that her project "was seriously damaged by the raid" and goes on to read a private email message that was on the seized BBS and ostensibly "investigated" by the SS. The message contains a beautifully mushy personal letter from SJG writer Steffan O'Sullivan about another writer at SJG - Walter Milliken - whom she since has married. Milliken takes the stand and also describes the use of email on *Illuminati BBS* for SJG work. Walter understands email quite well, he's a computer scientist for BBN, the firm which created Internet.

Government loses a few cool points here, but Batten tries to recover by reading a sworn deposition from SS computer security specialist Larry Boothby who analyzed the seized equipment. Boothby claims to have used Norton Utilities to conduct word searches, which Batten explains to Judge Sparks: "He'd type in the word 'hack' and it would show on the screen with surrounding text." Note that Boothby wasn't available since he had resigned from the SS just as the case was scheduled to go to court "and could not be reached." Some think Boothby may have taken a fall for the organization.... As a tipoff, his deposition did include unfavorable remarks about Agent Foley's alleged computer expertise: "They might as well have had Mickey Mouse in there."

Kluepfel

Next on the dance card, Wayne Bell steps up as an expert witness for SJG. As author of the WWIV software for BBS - which *Illuminati* uses - Wayne's wares run on over 2000 systems, for an audience of 3 million. Wayne had been called in to review the *Illuminati BBS* as soon as the SS had returned it. "It appeared that all the mail had been deleted by March 20, 1990." Wayne testifies that he checked the PC's system clock and verified file time stamps with phone records which users had provided. "Off by about 6 minutes at most."

Judge Sparks asks to have the term "sysop" defined at several points - burn that into your memory. He claims utter ignorance of computing technology, which plays well into plaintiff's hand. SJG is trying to sue the US Government for damages based on Federal statutes and constitutional law, but the Government is pulling a classical defense tactic by snowing the judge with technical terms. So SJG needs to make this as simple and clear-cut as possible.

Next up to the stand comes Henry Michael Kluepfel, alleged computer crime expert and anti-hacker from Bellcore, looking surprisingly like a cross between Woody Allen and Adolf Hitler - whiny, wimpy, and vile. "I provide information related to threats" is the introduction Kluepfel uses to justify his place in life. He goes on to describe how in 1989-90 he'd been investigating the E911 document's spread by logging into suspected BBS under the handle "RUTDOC" and looking for files about computer intrusion. He whines at length about *Phrack*, *Jolnet*, E911, etc., but admits that (1) the *Phrack* issue in question with the E911 document *didn't* provide any steps for how to break into computers and (2) the information is available to the public anyway - "But not quite what was in the Bellsouth document." Judge Sparks becomes visibly lost in Kluepfel's sea of technical terms, and misses the point that Kluepfel just slit his own throat. So Kluepfel continues.... He talks about exploring *Phoenix Project*, about finding a file related to E911, downloading it, providing an affidavit to Bellsouth, then forwarding the file to the US Attorney in Chicago - William Cook.

Early in 1990, the *Phoenix Project BBS* shut down. Kluepfel explains that "Newlin was wondering where *Phoenix Project BBS* might reside since it wouldn't answer. Could Steve Jackson Games' *Illuminati BBS* be the new *Phoenix Project*?" Kluepfel goes on to admit the fatal flaw: "I did not tell Newlin that there was anything connecting Steve Jackson Games other than that Mentor was co-sysop of both BBS's and that both BBS's ran WWIV software."

Again, the judge is snowed in technobabble, and at this point the defense takes up questioning and prompts Kluepfel - the US Government's computer expert - to help educate the judge. Kluepfel testifies about having found evidence on the *Phoenix Project BBS*, including: "Kermit and XModem, which can be used as tools for computer crime." Sparks then speculates about the need for a raid, whether other alternatives were open: "Would it have been possible for the Government to take this issue to another Reebok [sic, should be RBOC] for information?" Kluepfel counters with his own reputation: "I was asked as an expert with 25 years in computer security, network security" - so ostensibly his word was good enough for the Government to act. So they did.

Hey, this guy is pure wretchedness distilled into a puny frame. During court recess I go outside to track him down, shaking his hand just to experience a pure, raw state of Disgust. We chat a bit, talk of our respective tenures at Bell Labs, how he works in a town where I used to live - Red Bank, NJ. Not a bad guy really, a bit nervous and defensive, probably a reasonable response for a person who has just lied under oath to a Federal judge and seems at least intelligent enough to know it.

Now the fireworks begin. Former US Attorney William Cook - who quit rather suddenly after the SJG case reached national press - climbs into the pilot seat. Finally those of us in the SJG peanut gallery recognize who this asshole is, since he'd asked us to shut up during court recess "so as not to pollute my testimony." As if it were possible. But... Cook struts up to the stand like a cross between Walter Matthau and Dana Carvey's rendition of George Bush, indignant and condescending to everyone in the courtroom except for the judge. Cook even interrupts court proceedings to correct plaintiff counsel on proper procedure. This guy got burned by the SS raid and now has a score to settle. Cook responds to cross-examination about his $79,000 figure for the worth of the "stolen" E911 document. Under oath he specifies that $22,000 was for the purchase of an Interleaf word processing software package, several more thousand was for computer hardware used to type the document, along with salaries for people doing the typing.... When pressed by plaintiff counsel, Cook admits those pork-barrel systems were not used up in the process of typing a few pages.

More to the point, Cook admits (1) that he knew about the Privacy Protection Act (PPA - which limits government seizure of equipment from publishers) but didn't advise the SS about its implications prior to the SJG raid, and (2) that he understood the relevant wiretap law in the Electronic Communications Privacy Act (ECPA - which MAY limit interception of email) but didn't advise the SS against seizing a BBS that contained unread email.

Cook then ties in DOD's Computer Emergency Response Team (CERT) which "visited" Craig Neidorf about *Phrack* and E911: "As a result, agents sought and received a search warrant" against SJG. Cook explains that after the seizure, two files were identified and deleted - an alleged password cracker called "DE ZIP" and some unspecified software believed to have been illegally copied - however he fails to specify *which* computer held the deleted wares. Keep that in mind too....

Judge Sparks kicks in to question William Cook for a bit, uncovering two startling items: (1) Cook's admission that the US Attorney's office made no attempt to determine the nature of SJG's business prior to the raid, and (2) Cook's claim that he is "aware of an ongoing investigation about criminal charges against Blankenship and/or Goggans."

Next in line, SJG's accountant steps up to provide expert testimony about the damages incurred by the raid and confiscation of equipment, records, drafts, etc. The accountant cites several key losses: gaming books not being released, delayed shipments, loss of the BBS as a communications interface for the firm, layoffs of good talent, impact on Steve Jackson's own time for creative writing, and expenses for litigation. She provides balance sheets, cost estimates, revenue projections, etc., but the Judge seems annoyed. Even using a seven percent interest rate for present discount values (a financial giveaway to the Government), the accountant arrives at a $2.1 million total for damages. Sparks doesn't seem happy and calls it a day...

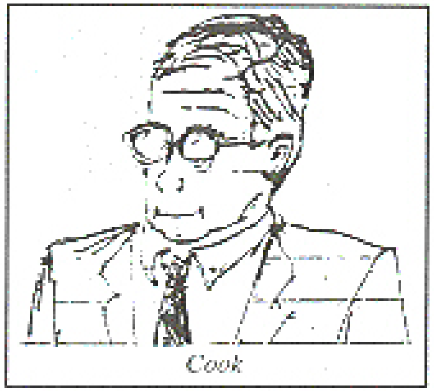
Day Three

After a delay caused by unrelated legal proceedings, Government defense steps up and attempts to have the case thrown out of court, urging Judge Sparks not to risk extending the ECPA statute. In response, Sparks grows annoyed: "It appears to me that I'd have to rewrite that statute to agree with the Government's case.... It appears that Loyd Blankenship could have prepared to engage in some heavy criminal activity. You saw a BBS with a notice about conspiracy... but it would have taken an hour or less to do [the investigation] as it should have been done. Don't you think Congress should decide how far the ECPA should extend? I don't think ECPA applies in any way to this case - so what? Did Blankenship have possession at the time the search warrant was executed by his ability [as sysop] to delete files? I want that answered."

EFF-Austin members drop by to watch the last part of the trial - several students even manage to get out of high school for it - but a Fed Marshall boots them out because the males aren't wearing suit jackets.

SS Agent Tim Foley hops back up as defense witness. He describes his impression of the confiscated *GURPS Cyberpunk* to build the Government's case about a "potential hacking conspiracy." "It appeared to me to be a fictionalized account of what LOD was doing." Back under cross examination, he admits there was nothing in the search warrant's affidavit about a threat to national security, the disappearance of the *Phoenix Project BBS*, evidence of the *Phoenix Project BBS* appearing at SJG, or evidence incriminating any other BBS at SJG.

Foley launches into an account of how Blankenship's former place of work - Nth Graphics in Austin, TX - had also been "visited" at the time of the SJG raid. "We had a record that the E911 document had gone to Nth Graphics. We went there and asked to see the machine but it crashed so we didn't pursue any further." Foley verifies a plaintiff's exhibit - a handwritten document by SS agent John Lorenzi which explains that a purported NSA document found at Goggans' home actually had a SJG logo, trademark,



Cook

and copyright on the bottom, i.e. it was just a part of a game.

At this point plaintiff counsel Pete Kennedy and Judge Sparks both question Foley, in a legal equivalent of an online chat, making defense counsel turn pale...

Foley: "It took one week on the machine to analyze the files."

Kennedy: "But the equipment wasn't returned for three months?"

Foley: "Yessir."

Sparks: "Why?"

Foley: "We had to make reports."

Sparks: "But clearly after one week, the United States of America could have finished analyzing the disks and have returned the equipment to Steve Jackson Games?"

Foley: "Yessir."

Foley goes on to say there was never any evidence to incriminate SJG before or after the seizure. Sparks presses again, emphatically: "Why couldn't copies of *everything* be made within seven days and returned to Steve Jackson Games as requested by his lawyer?" So Foley admits there was no reason not to return equipment after March 25, 1990 at the latest. The tragedy is that Foley had been insistent on the raid, and yet he'd only become aware of SJG on February 22, 1990 - just one week prior.

In closing remarks, Judge Sparks reveals a dangerous misconception: "How do I know that illegal material was not in the *GURPS Psychopunk* [sic] drafts? We know that the computers contained sensitive materials (E911 document) and even illegal materials (DE-ZIP)... But let's assume a violation with regards to *GURPS Psychopunk* [sic] occurred, what were the damages established by the evidence?" Then he asks both sides to interpret the PPA statute.

Plaintiff specifies the damages to include loss of BBS and delay of *GURPS Cyberpunk* release, which struck SJG at the worst possible time financially and cost eight people their jobs and reduced SJG's creative talent.

Defense dismisses the damages by claiming that the raid "only delayed *GURPS Cyberpunk* by less than three weeks (a down-sized version based on old drafts was released, late), plus better management procedures after the seizure which forced Steve Jackson to spend less time writing and more on business may have been his best business move ever."

Sparks counters this tripe: "So the Secret Service is now helping businesses by search and seizure? The officers charged with this 'evil conspiracy' obviously jumped to a conclusion.... Admittedly without evidence they took three computers and 300 disks and ignored Steve Jackson's lawyer's attempts to get back the equipment. It just doesn't pass the smell test for the Government to come in without any evidence against the company and take things that *anybody* could tell would harm the company. The reason this wasn't done in good faith was lack of investigation by the Secret Service. Evidence shows that by March 2, 1990, somebody in the Government knew a book was involved [in the seizure]. There is no question in my mind that Steve Jackson Games Inc. sustained damages and expenses as a result of misconduct by the US Secret Service..."

Epilogue

Immediately after the trial, Steve Jackson seemed pretty discouraged. He and Pete Kennedy walked across the room to talk with Mark Batten and company, offering "We've been talking as people to each other for quite some time" - to which one of the Government lawyers returned "Now you know that we're not multi-headed Gorgons; we've all been in the same trench." Maybe not.

Later that night, a number of us met to decompress. We play-tested a new game (about post-apocalyptic mutated rabbits) that somebody had submitted to SJG. Steve wanted to play, wanted to do anything but hear the words "lawyer" and "Secret Service" again for a long time. I brought over a collection of Smurfs In Hell game wares for him to check out. When I left just past midnight, Steve was killing everybody else's bunnies, nuking Mormonoids, and studying notes for another game all at the same time. This, after standing up in the face of the United States Government, after fighting the good fight for three years without a payback - other than integrity. With all the courage and the humor and the genius shown through, you have to admire a guy like that. Outside the WWII newsreels you don't find many heroes, but here is one indeed.

All courtroom sketches drawn by the author.

As this issue went to press, the verdict in the Steve Jackson case had not yet been reached. It's quite likely that there has been a decision by the time you are reading this. We will leave a recording on our main office line (516-751-2600) as soon as a verdict is announced. Details will appear in the Summer 1993 issue.

SJG TRIAL: 2600 PERSPECTIVE

One Angry Judge

by Scott Skinner

foley (fō'lē) *n.* a costly legal undertaking by an individual or individuals lacking in common sense, understanding, and foresight, resulting in an absurd or ruinous outcome. [Middle English *folie*, from Old French, from *fol*, foolish, from Latin *follis*. See fool.]

We tried. Tried our darndest to see the trial. Trains, planes, and automobiles: we did 'em all. Even drove halfway across barren Texas desert, to places where even the radio waves don't go, and "TV" is something you catch in a dish. Hell, our white rented compact got wind-whipped off the road so much we nicknamed it "Snowflake". But alas, for us the trial was never to be. "Postponed a week," they said, as we clutched our palpitating hearts. "Heh, heh," they chortled, "that's the legal biz for ya." Yeah, we thought, heh, heh. So there you have it. *Right* place, wrong time. The trial hadn't even started and already we were in the grip of morality.

And just why did we go through all the trouble? Trial's a trial, right? Wrong. For hackers, the Steve Jackson Games trial was nothing less than a religious event; Rome, Jerusalem, and Mecca all rolled into one. It was Woodstock for techno-anarchists, and although our own pilgrimage ended a week short of the gavel, it was not without its moments.

We met Steve at a local Texacana joint, amid the fury of a hip Austin nightlife. He was surprisingly pessimistic, despite news that the judge had admonished the Secret Service for trying to stall the case. Still, Steve was anything but hesitant. Cynical, yes. Reluctant, no way. "We've waited a long time for this," he said. So we had. It was almost three years since the March 1st raid of Steve Jackson Games by the Secret Service. And three years waiting for justice is a long time by anyone's standards. As we listened to Steve's gloomy trial prospects, we understood that his terminal pessimism was a reflection of the chilling effect the raids and busts have had on us all. Computer enthusiasm and prospects for unfettered global electronic communication seemed dead and gone, replaced instead by a hyperwired hyperparanoid community of closeted dissidents. For many of us, the Steve Jackson trial was the only thing to look forward to. It would hopefully put an end to First Amendment ambiguities that have plagued us ever since the dysfunctional trial against the electronic newsletter, *Phrack*. Through a margarita haze we left Steve and wished him luck. The trial was one week away, and there was nothing left for us to do but slack. Back at the office, we watched and waited.

The trial itself lasted three days. News of the event spread across the Internet so quickly it would have put the AP newswire service to shame (that is, if the AP had even bothered to cover it). The plaintiffs effectively established that: 1) Neither Jackson nor his company SJG were ever suspected of any wrongdoing; 2) There was no investigation of SJG by the SS prior to the raid; 3) The affidavit used by the SS to obtain their search warrant was erroneous; 4) The search warrant did not even meet the Service's own standards for a search-and-seizure; 5) The work in progress of a publisher was seized, in violation of the Privacy Protection Act; 6) The SS were incompetent, because they were not even aware that this law existed; 7) Electronic mail was seized, printed, and read, in violation of the Electronic Communications Privacy Act; 8) Electronic mail was deleted - evidence was "destroyed"; and 9) The SS purposely and willfully stalled three months before returning seized computers and disks to SJG after the investigation was over.

Incredulous? Outrageous? Judge Sparks thought so, which is why he spent fifteen minutes straight reprimanding Tim Foley (the agent responsible for the raid) for the behavior of the Secret Service. The dialogue that follows is perhaps the highlight of the trial:

Sparks: *"Did it ever occur to you, Mr. Foley, that seizing this material could harm Steve Jackson economically?"*

Foley: *"No sir."*

Sparks: *"You actually did, you just had no idea anybody would actually go out and hire a lawyer and sue you."*

According to the plaintiff's attorneys, Judge Sparks was "visibly angry," and the government was so shaken after being chewed out that they rested their case.

Sue the Secret Service? They said it couldn't be done. And yet this is exactly what Steve Jackson accomplished with the help of the Electronic Frontier Foundation. If the SJG trial has proven anything, it is the importance of a source of electronic civil liberties protection. Steve was fortunate to have the resources of competent EFF lawyers; many others are not so fortunate. Electronic civil rights activists are needed more than ever. Activists who will not just lobby the government, but go the distance in court against big business, bad law enforcement, and their dated conceptions of First Amendment freedoms. Although the judge has yet to deliver a verdict on this case, we are confident that it will be favorable and precedent-setting. The SJG trial has sent a powerful message to an overzealous law enforcement community: no one, not even the Secret Service, is above the law. We can only hope that, in the days that follow, the Secret Service will take heed of this message before pulling another foley.

LETTERS OF MERIT

Cordless Questions

Dear 2600:

I was wondering if you know how cordless phones work? I know they have an input and output from the base. But do they all use codes to access their base? I thought maybe some of the older ones didn't and just used a squelch. It would be interesting to find out exactly how they work. I don't know if there's a law on cordless listening in the 49mhz range? Thanks!

Happy Reader
North Dakota

There is no law against listening to cordless phones. Basically, cordless phones have no rights and must accept whatever interference and monitoring they're subjected to. Really old cordless phones broadcast on 49 mhz from the handset to the base and 1.7 mhz from the base to the handset. With these, it was relatively easy to wander around a neighborhood with a cordless phone and pick up other people's dialtones. The cordless industry has woken up however. Newer models have frequencies of 46.61 to 46.97 mhz from the base to the handset, 49.67 to 49.99 mhz from the handset to the base, each with ten channels. These models, which have been around for six or seven years, use digital security codes. Some of these have thousands of codes. Others use a system known as rolling security codes, where the code changes with each call. The newest models use 902-928 mhz. Some of these digitally encrypt the audio.

Bypassing Restrictions

Dear 2600:

Recently, my college dorm installed a Sprint long distance calling code program in which a five digit code must be entered after dialing 9+1+area code+number. Being the curious guy that I am, I wondered if I would be able to get through to 900 services without being routed through the Sprint service or denied calling out altogether. As it turns out, the first time I tried it, it worked, without going to the tone for the phone code. After that, it wouldn't work. I kept getting a message saying that the call couldn't be completed and an operator would not be able to help (weird). My question is, why does it work sometimes and not the other times? Recently, I have been able to get through to the same number. But again, the next try wouldn't work.

Confused,
Major Tom
Champaign/Urbana, IL

There are many reasons why this could be working sporadically. It's actually quite possible that certain provisions of security can be bypassed depending on which outgoing line you grab. If this is the case, you can rest assured that the software is quite sloppy and there are probably many other such bugs. Perform some experiments - see if this works more during busy hours. Also, experiment with other numbers as well. It's possible any number might work if there's a software glitch. Remember that it's also quite likely that everything you dial is being registered somewhere.

More Simplex Stories

Dear 2600:

Apparently someone has been applying their knowledge of Simplex locks, especially on FedEx lockboxes, in the Boston area. Apparently FedEx is less than happy about this, and has taken measures to put an end to the robberies. If it were me, I'd do something about the locks. But it's not, and FedEx disagrees with me. They've gone to the police, and gotten them to "stakeout" a number of FedEx lockboxes (the ones being robbed, I guess). But they have not (yet) changed any of the combos on their lockboxes (I checked - still the same). I don't know if UPS has done the same, or whether the thief has even bothered to take from them. I personally have seen no instances of stakeouts on UPS. Their boxes continue to use the same combination.

A Fly on the Wall

It's incredible how stubbornly some companies will cling to their ignorance.

Dear 2600:

I recently saw a push-button door lock made by Best Lock Co. that looked identical to the Simplex Series 1000. Are these Best locks as unreliable as their Simplex counterparts? Can each number only be used once in the combination, thus reducing the number of possible combinations?

Per
Lafayette, LA

Best does not make pushbutton locks. What you probably saw was a Simplex lock with a Best core. Some Simplex models have key bypasses and the keys can be made by any company.

Mysteries

Dear 2600:

Recently, I stumbled upon a program called MCI VoiceLink v6.1. It runs under the Unix operating system. I have thoroughly investigated the actual VoiceLink program, and still have yet to figure out what its main purpose is. I've heard descriptions ranging from "a long distance billing maintenance program" to "a simple voice mail program." Judging by the name of the program, I am inclined to believe the latter, but am still unsure. Any help on this issue would be greatly appreciated.

Anon.

A lot would depend upon where you found it. But it's not even necessary in a case like this to do a lot of covert activity. Call the friendly folks at MCI sales and ask them for brochures. We doubt they want to keep it a secret.

Dear 2600:

I was wondering if you could answer a question I have about this set of numbers I discovered. There are four numbers I found with the same message on them - in two pairs of two. There is no ring-tone when connected, and the recording quality sounds like a Voice Mail service. The numbers are: 0800 873 873, 0800 873 874, 0800 879 879, 0800 879 880. When connected, you hear this: "This is an STC test number. Please enter the CSG [could be CFG - it's not clear] you wish to simulate." Then it accepts 17 digits and either gives a continual tone (disconnect) or an engaged tone (warble). So, what is it? I don't know if it's important, but is the answer connected to the fact that each pair is right next to each other? Hope you can help. Incidentally, could you tell me if you know of a UK magazine similar to 2600?

DG
UK

We know of no magazine like 2600 in England. If anybody figures out your mystery numbers, we'll print the answer here.

Dear 2600:

While scanning my local exchanges, I've come across a few numbers that seem to cut voltage to the line for about 15 seconds. For example, after dialing 517-646-9994 the line dies and even attempts to produce normal DTMF tones result in silence. Do you have any idea what I've come across? Incidentally, ANAC for 517 is 2002002020.

Maelstrom 517

It sounds like another phone company test number. Anything that cuts voltage, sends weird tones, and resides in the 99xx or 00xx area is almost certain to be telco-related.

Hacking Passwords

Dear 2600:

I have a 2600 issue from Summer 91 which talks about a Unix password hacker. It doesn't give the source code or any real info, because it was given in a more previous issue of 2600. Where can I find this "password hacker" and the source code? Is there a VMS VAX equivalent also?

MR

There are lots of password hackers out there. The best one we know of is BERKLEY.EXE which comes out of Holland. There are many more that are designed to run on different types of computers. Obviously the more powerful the machine, the quicker a password hacker will run. By wandering around on bulletin boards and the Internet, you should be able to find some of these programs. Unix systems are such popular targets because, unlike other operating systems, the password file is world readable (with the exception of those systems that use shadow passwords). It is not illegal to read this file. It's also not illegal to run a password hacker on your own computer, provided you didn't obtain the password file illegally. Actually using a guessed password is where you might run into problems.

That Bell Computer

Dear 2600:

You guys really pissed me off with your Telco News Winter 92-93.

What a stupid thing to put in your mag! It's been well known among the hackers for years that most security is overlooked and in some areas blatantly ignored. Writing about one particular company's security weaknesses is a direct *slap* in the face. As a result, that company will be *highly* pissed and most likely take procedures to tighten up security. But you're defeating the whole purpose of hacking: learning! How much information could have been learned from that one particular system? It's hard to say. What do you do though instead? "Oh, hey let's put it in 2600 so we will show them how stupid they are." Did you ever think that you might be *ruining* it for the other hackers out there that are trying to learn about the phone company's computers? Nah, I don't suppose that even crossed your mind. The article was lame anyway to those of us who know what's going on. Most of that shit was information found on the Bell Newsletters. Of course the phone company is gonna say that hackers cost them money. They want the general public to keep believing in the same "Hacker Hood" image that *Forbes Magazine* proudly wrote about. It should be obvious to you that after the 911 incident with Neidorf, the embellishment of things damaged or costing money was pure BS made up to make the hacker look bad, malicious, or anything but the *truth*. I just lost a lot of respect for 2600 when you printed that. Heh! Not that that matters much anyways. I don't think you guys ever did any *real* serious hacking. Otherwise you would be working on some decent projects instead of publishing a magazine that keeps all the security people up to date on what we are doing or things we have uncovered. My main point is: *a hacker would never tell an admin what holes to patch if he wanted to continue hacking the system!*

So why are you?

lagden02

First off, we print information that we feel deserves to be shared. We don't agonize over what the enemy will do with it, whoever that may happen to be. If we did, we'd probably never be able to print anything. As far as your "concerns", let's get a little real. We're talking about a major computer system that has a wide open front door into root! Who would we be serving by keeping that to ourselves? Something along these lines is way too bizarre for our tastes. And, sure enough, at least one of our readers was able to provide some valuable insight into this (see next letter). Had we done it your way and kept it to ourselves and all of the people like you "who know what's going on", this nationwide hacker trap would never have been discovered.

Dear 2600:

Enclosed is a capture of a Pacific Bell system.

login. As you can see, after six attempts, anything will log you in. This is identical to the SouthWestern Bell computer mentioned in the Winter 1992-93 issue. Apparently it's some kind of standard RBOC hacker trap. Does the word entrapment spring to mind? Either way, the writer never actually broke into the SouthWestern Bell computer and neither will anybody who calls the number you listed. They'll simply fall into this false shell trap.

The Road Warrior

Thanks to you, our writer has now come out of hiding. The printout you sent us was almost completely identical to what we had printed. Considering this comes from another RBOC, this must be a standard ploy for many phone companies. Our next question is what are they doing with these traps?

Correction

Dear 2600:

The frequencies given in "Defeating Callback Verification" (Autumn 1992) for the dial tone are wrong. After many hours of picking up the phone and listening to the dial tone, I decided that the correct frequencies were 350Hz and 440Hz.

CA
Georgia Tech

We stand corrected. For a collection of correct frequencies, you can refer to the Summer 1992 issue, page 12-13.

Info

Dear 2600:

Here is a tidbit you may want to share with your readers: the AT&T calling card lets you call without any surcharge from any phone booth, hotel room, etc. for 10 cents a minute under the following conditions: 1) You subscribe to Reach Out America ($10 month includes one hour of free out-of-state, off-hour calls); 2) Your call is made to a number which is in a different state than the one you are calling from; 3) You call off-hours (weekends or 10 pm to 8 am).

Concerning the ongoing issue of lack of security and verification provided by various institutions (banks, telephone companies, etc.). I lived for many years in European countries (Poland, France, Switzerland, Great Britain), where you are not trusted by anybody. Every action requires positive verification. This may prevent some errors but it makes life very difficult for citizens who do not want to abuse the system. Making a collect call or third party call takes twice as long because everything has to be verified. All contacts with authorities have to be done in person as nobody trusts a phone call. Even a letter is suspect. Coming to the United States, where you are in general trusted by the authorities, was a big relief.

CL
Holmdel, NJ

While the AT&T plan is better than nothing, there are still far too many restrictions. What we need are inexpensive, surcharge-free, and easy ways for all of us to make coin free calls from anywhere in the country. Any phone companies out there interested?

Dear 2600:

We have a quantity of surplus touch tone desk phones, including the five-button model. We would like to export them to the Ukraine. Pulse is necessary - is there an in-line converter from tone to pulse and pulse to tone? Something that would be an inexpensive add-on!

JR
Kingsburg, CA

We know of no such device that's already constructed. Basically, you'd need a touch tone decoder to convert the signal to pulse. It's sort of like constructing a time machine.

Dear 2600:

Here are some phone numbers that go to a tandem computer running the MIX EDI system: 602-941-3816, 3817, 3782, and 3783.

They are on an EDI system used to transfer IGES engineering design files. Don't be surprised if you see missile or missile guidance systems in them.

The Tick
Arizona

Few things surprise us anymore.

Dear 2600:

Greetings! Your readers may want to know about the magazine *Midnight Engineering*. It's loaded with articles about single-board computers, microcontrollers, embedded systems, etc. The latest issue has an ad on page 83 for "Spy Supply" and advertises a "cellular telephone modification handbook" for $79.95. Looks interesting. One of your recent letters asked about cable TV hacking. Here's some info. Most of the current models of descramblers are digital. There's all sorts of internal monitoring software in these beasts. A friend of mine works for a local set-top manufacturer and gave me the scoop. These boxes can detect tampering and have programmed in "grace" levels. If you mess with them, they'll shut off, but if you undo your wrongs, it'll forgive you and start working again. If you really mess with it, it'll write alternating 1's and 0's into its program store and die. The way they catch hackers is something like this: the central office (to borrow a phrase) sends out a signal that says "everyone now getting HBO, raise your hands" and the set-tops do. It then says "I will now read a list of everyone who's supposed to be getting HBO. As I call your name (ID), you may lower your hands." When the roll call is done the signal is then sent out "everyone who still has your hand up, please self destruct." Kablooie: 1's and 0's. Here's a fun hack: stretch out those "free preview weekends". The cable company sends out a signal that says "all non-privileged set-tops, turn on HBO" and you enjoy the weekend. They then send out a signal at midnight Sunday: "OK, turn off HBO." Suppose your set-top gets the turn on signal and somehow gets unplugged from the cable system while the turn-off signal is being sent. It wouldn't know it wasn't supposed to *not* be getting HBO when it was reconnected sometime Monday. A friend of mine tried this and even called the cable company to report that he was still getting HBO. They didn't believe him and never did anything about it.

Gentle editor, I have some experience with what the local BOC calls ESSX (son of centrex). The most interesting part of this is the customer is allowed into a database to reprogram his phone features. Yes, Ma Bell actually encourages customers to do this. If you think it would be of interest, I could knock out an article on ESSX hacking.

Avatar

We're certainly interested in articles like the one you suggest. As for cable, check out page 16 for more tricks.

Dear 2600:

In your last letters column was a request from a reader on a magazine called *Mobile Office*. I got it at the office, so here's the info: Subscriptions can be placed at (800) 627-5234. Letters to the editor can be addressed to 21800 Oxnard Street, Suite 250 Woodland Hills, CA 91367. FAX: (818) 593-6153 Compuserve ID. 76646,3722. I found your magazine on the rack at the new Jack London Square Barnes & Noble. I had heard about it both on the Well and in other publications.

Ken

Dear 2600:

I think someone a while ago asked about those stand alone credit card readers/dialers. I got an old VERIFONE, and we also use a new model where I work. The password to get into them is 166831 (I think some of the new ones replace that with Z66831. I haven't totally got it figured out yet, and there are a lot of differences between the old and new units, but if you're interested I'll get back to you. There are some big registers in there that I think control it by setting bits. I know the one I have can go into a diagnostic mode by hitting * and 3 at the same time, giving you four diagnostics to chose from. Choosing 4 lets you swipe a card and read whatever's on it.

Misha

Dear 2600:

I've found out some interesting stuff on the ever-popular Radio Shack tone dialer conversion. According to the original article (*2600*, Autumn 1990) the optimum crystal frequency for creating red box tones is 6.490 MHz. As shown in that article, a 6.5536 MHz crystal would work. However, I noticed that Digi Key (800-344-4539) sells extremely small 6.500 MHz crystals, so I tried one in my tone dialer. It works great, although the timing of the tone pulses is audibly different than a real quarter tone. I installed this tiny crystal inside the dialer, along with the original 3.579 MHz crystal and a mini slide switch. If you want to try the 6.500 MHz crystal from Digi-Key, get part number X415. Only costs $1.73. I also noticed that the dialer can generate a single-frequency tone. I'm talking about the "error tone" that beeps at you when you enter an invalid key sequence. This tone comes out of the little piezo speaker rather than the large main speaker. You can beep the error tone by pressing the "memory" key twice, for example. The pitch of the error tone changes with the crystal frequency of the dialer, just like the DTMF tones do. I was curious as to how the pitch (or frequency, if you will) of the error tone was related to the crystal frequency of the dialer, so I checked it out in the electronics lab. I found that the frequency of the error tone is equal to the crystal frequency divided by 1024. For example, if the crystal frequency is 3.579 MHz, the frequency of the error tone is 3579/1024 = 3.495 kHz. So if you wanted to generate a certain single-frequency tone, like 2600 Hz for instance, the necessary crystal frequency would be the desired error tone frequency times 1024. For 2600 Hz, the crystal frequency would be 2600*1024 = 2.6624 MHz. Unfortunately, this is not a standard crystal value. With all this in mind, it would be very convenient to have multiple and selectable crystal frequencies for your tone dialer. If anyone could come up with a low power, stable, variable frequency oscillator which was controllable from the dialer's keypad, that would be a major hack.

Mr. Upsetter

Red Box Questions

Dear 2600:

Is there a known incompatibility with red boxes and Pac Bell payphones? I've tried it on Pac Bell payphones all over town with no joy. A friend suggested that Pac Bell may have tweaked the tones a wee bit so as to render the red box trick useless.

I wish that I had looked in the back of your mag before ordering from JAN crystals: I could have saved a few dollars building a device that may only be of use in other parts of the country.

Frustrated in Berkeley

There are two types of calls that will accept red box tones. One is for intra-BOC (in your case Pac Bell) calls (not local calls that don't require an additional deposit). The other is for calls handled by a long distance company. These are two different systems so what doesn't work on one may work on another.

Data in the Air

Dear 2600:

I have two questions. First, I have recently bought a $20 radio transmitter from a mail order place that advertised in the back of *Popular Science*. What I was wondering about was, would it be possible to send data from a modem over the airwaves via the transmitter? And just have the people listen in, connect their modems to a radio receiver, and watch as the data is fed onto their screen. Next, could you try and settle an argument I am currently in with my friend. On New Year's Eve, while my friend was phreaking with a payphone, and we were waiting for a ride to pick us up, I tried to explain to him that television cable was transmitted over the phone lines. He doesn't believe me, and although I do believe I read it somewhere, I am not certain either. Think you could clear things up for the both of us?

The Winged Placenta
Oregon

It certainly is possible to transmit data over airwaves. WBAI FM in New York did this a number of years ago. Of course, most listeners felt compelled to change the station at that point. If your transmitter is delivering a clean signal, you should be able to do the same thing, however your range will be very limited. Cable TV can only be transmitted over phone lines if the phone company controls cable TV. It's considered the wave of the future to have this happen, as well as to have cable companies delivering alternative dialtones.

Questions

Dear 2600:

In your current issue, in response to a letter for books to read to better understand telecommunication systems, you list *Telecommunications System Engineering* by Roger L. Freeman. I have accessed my local library's computer network (which is connected to about every library system in the northern part of Ohio), and found only one location with this book. They have it listed as a reference book, which means it cannot leave the library. This library is not anywhere near to me. What I would like to know is if you have an address to the publishers or someway that I can get a copy of this book? Thank you. And keep up the great work!

JG

That book is readily available in bookstores. If you need to contact the publisher, they are Wiley-Interscience located at 605 3rd Ave., NY, NY 10158. The ISBN number of the book is 0-471-63423-9.

Dear 2600:

In the book *Out of the Inner Circle* the author mentions that in 1954 the Bell telephone system published a complete description of the multifrequency system, including the specific frequencies and descriptions of how the frequencies were used. Is this information still applicable today? Hasn't the phone system done anything to stop the use of blue boxes? Can I get a copy of this article somewhere?

TW
Binghamton

You can probably find that Bell document in a technical library somewhere but you can get the same information in any hacker publication, including this one. And, yes, the phone company has done quite a bit to stop the use of blue boxes. The sixties are really over.

Dear 2600:

Is the $260 lifetime subscription retroactive to all back issues?

MJ
Massachusetts

No, but as of now, all lifetime subscribers also get 1984, 1985, and 1986 back issues. (No substitutions!) Current lifers can write us if they want to get those issues.

Dear 2600:

It would be greatly appreciated if you could answer a few questions for me. First, does AT&T or any third party sell operator or service manuals for telephone switching systems? Second, how does one find out which switches are where? Third, what frequencies do cellular telephones transmit on? Finally, is there any way to tell if ANI is being used on you?

SB
Massachusetts

You can get phone company related manuals from the AT&T Customer Information Center at 800-432-6600 or Bellcore at 800-232-3227 or 908-699-5800. We should warn you that they can be rather expensive. For a free guide, ask for the catalogue of technical information. As for finding switches, it requires a bit of skill. You have to find someone in the phone company who can tell you, which can be amazingly difficult. All the cellular info you could possibly want can be found starting on page 4. ANI is always being used in some sense - operators and the billing computer always receive that information. It's wise to assume that all 700, 800, and 900 numbers are using ANI.

Dear 2600:

What issue contained the article "How Phone Phreaks Are Caught"?

Also, I built a red box and use it on fortresses when I'm on the road. I've used it on a couple of payphones by my house. Is this wise? What are the chances of getting caught?

Finally, does anyone monitor what goes in and out of the 2600 offices?

Freaked-out Fyodor

That article was in the Spring 1990 issue. But if you keep it up, you may be writing the sequel. Blue boxers of the past were caught primarily because they used the same phones, even ones inside their homes. Red boxers can only use payphones but the same logic applies. If a phone is abused enough, it will be monitored at some point. And if you happen to be a suspect in the neighborhood, it could get unpleasant. As for people monitoring our traffic, we have no way of knowing. But we do know that nothing and nobody comes into the office without our approval.

Dear 2600:

There used to be a three digit number in New York City that one could dial, hang up, and get to ring to your own phone. I had used this several times years ago and learned that the number is changed regularly. I contacted a New York Telephone techie a few weeks back who advised me that this phone capability has been discontinued. Since I cannot take this as gospel, I am hoping that you have this "secret" way of getting your own phone to ring without having to ask the often-reluctant operator to do the same. This capability is useful to me when I wish to check out my somewhat defective Code-A-Phone answering machine.

Also, perhaps you can tell me where I might purchase the removable carbon pile mouthpiece that slips into the "talk" end of the handset. It has no wire connectors and makes contact by pressure alone. The phone company will not sell me one. (The carbon in the piece evidently cakes up. Tapping it on a table can help, but mine is tapped out.)

AB
New York

The prefix 660 plus the last four digits of your phone number works in much of New York. After getting a second dialtone, you flash the switchhook, hang up, and your phone should ring. An alternative way of getting a ringback is to subscribe to 3-way calling. While connected to something (preferably toll-free), flash over to your 3-way, then hang up. Your first call will ring back. As for getting a new mouthpiece, go to where old phones are found. Yard sales are one place where you can find old phones and their components for virtually nothing.

Dear 2600:

In the Winter 1990 issue (page 28) there was a request for development of a circuit or "add-on" box to send a false number to the party you are calling through Caller ID. Has any such animal been developed or are there any such plans in the works?

JL
Shoreham, NY

We hope there are plans but we have yet to see them. Any readers out there interested in doing this?

Dear 2600:

I play guitar in a ska band in New York City and know a bit about the origins of the music. I noticed a cover a while back drawn by a "Sir Lord Comic", who was a ska spinner in Jamaica back in yon '60s. I have little doubt that the Sir Lord Comic who penned the cover knew of him, but I just had to make sure it wasn't the original. No way, but I had to ask. And another cover with reference to a Bob Marley song made me have to ask. I love *2600* incidentally, keep it coming!

Brendog

You're very observant. Sir Lord Comic was not the name of the artist who did the cover even though it looked like a signature; it was a reference to the very person you mentioned. Lawless Street was another reference to a ska song of that era which appeared on the same cover.

Fixing Your Credit

Dear 2600:

Just picked up the Winter 92-93 issue. The enforcement of the Fair Credit Act comes under the jurisdiction of the Federal Trade Commission. That's why the "police" wouldn't help parcid. He has to write to the FTC. And yes, Motorola did violate the law big time. He may also write his Senator and Reps about the problem. If all they do is write a letter on his behalf it can be enough! If AMEX gave Motorola a card in his name *without* having his signature on an application, then they are in the big doo-doo - once again FTC's jurisdiction. For anyone else having credit problems: First talk to the person who put the stuff on the report. Many times they can be dealt with (if you are nice and they are too). If the bad stuff is from Sears, it may take a personal visit but many car dealers/mortgage companies know that Sears is the worst and will *completely disregard* any negatives from them. Next either have the creditor contact the big three (TRW/CBI/Equifax) or contact them yourself via letter (*always* certified with return receipt requested) and point out the error. They will investigate and get back to you in 6-8 weeks. Most problems are solved at this point. If you still have a problem with a creditor validating a bogus derog about you, call them or write them one last time and ask them to produce the evidence (the credit slips you charged but never paid for). If they can't and they don't remove the derog, write the FTC *and* congressmen. A lawyer is the *last* step. Most often you don't need one. You can after all file a suit PRO-SE (in your own behalf). Sometimes though, as I said, a *personal* visit to the credit office of whoever is the pain in the butt will *help* immensely. Get their phone number and call (or visit) a library near them. Look in *Coles* (reverse directory) for the address. Usually the *actual* number will not be there but you will find a number close which is the start of the block for their PBX. Now you have the address. Get into a suit, clean up, cut your hair (fair? *No*, but it works!) Give 'em an unannounced visit. Don't take "s/he's in a meeting". Be firm, but polite. Stick up for yourself. This procedure clears 95+ percent of incorrect (and bargains away 75 percent of correct) derogatory information from your credit report.

DC Central

Surprising Facts

Dear 2600:

Have you seen these numbers from the phone companies? The major telecom carriers are reporting that 1992 was a bad year for the phone baddies intent on ripping off phone service from corporations. Sprint reported fraud claims by its business customers dived 96 percent, to $670,000, or $1,350 per incident compared to an average loss of $35,000 in 1991. AT&T says fraud claims made to it dropped about 88 percent, and MCI says it has also seen a drop in claims. In other words, 1992 losses were a far cry from the $1 billion to $3 billion a year claimed as losses in past years. The major reason for the drop: customer awareness.

JM

Meanwhile the number of hackers continues to rise.

Spanish Connection

Dear 2600:

I would like to collaborate with *2600 Magazine* and send articles and general information from Spain. There are very many people interested in hacking in

Spain and Latin America.

Here is some interesting information:

Criminal Justice Bulletin Board Services: 602-256-1609, 415-644-6806, 408-287-8399, 916-392-2550 (NCIIS - SEARCH), 818-405-4242, 714-834-8931 (APCO), 310-825-3736, 310-825-9057 (DAIMP), 719-591-7415 (FIRENET), 303-987-7388, 904-646-2775, 301-447-2787 (Arson BBS), 301-738-8895.

My hacker group is IBERHACKER.

GMV
Motril-Granada, Spain

BBS Info

Dear 2600:

I was wondering if there is some sort of BBS newsletter to keep me informed on BBS comings and goings, which are hot and which are not, etc.

JCB
Concord, NC

Boardwatch is probably the best. You can reach them at 800-933-6038. For those outside the U.S., dial 303-973-6038. If we hear of others, we'll pass them along.

Evil Payphones

Dear 2600:

I have noticed an annoying and disturbing trend in my local C&P Bell payphones. They have started to act like COCOT's. I first noticed it about six months ago, when a new legion of C&P phones with gray (rather than black) handsets started appearing. I placed a local call on one of them, using a quarter, and I could hear this little click a few seconds after the call went through that sounded as if they had just un-muted the speaker (it turned out this was true). Odd, I thought. Then, after three rings, this computerized voice came on and said something like, "Your called party does not seem to be answering. Please hang up and try again later." I was very irritated at first, because I thought it had disconnected me and would not even let me leave a message, but it in fact did not disconnect me. Nevertheless, this genuine C&P Bell phone acted exactly like a COCOT. Is it possible C&P is buying up COCOT's and converting them to C&P phones? The phone looked exactly like a standard C&P payphone, except that the familiar black handset was conspicuously gray. As you can probably guess, red boxing off of these new phones is as difficult or impossible as it is off of a COCOT.

I called C&P to ask them about this, but the woman I talked to knew nothing about any new C&P payphones. She thought it might have been related to their new Send-A-Call feature, which they apparently have been having a lot of problems with. But that didn't make any sense. This particular phone did have a plate below the instructional plate describing the Send-A-Call feature, which I hadn't heard of before, in place of the usual plate that says "Out of Change? Place a collect call, etc."

Inhuman
Arlington, VA

Nothing is impossible when it comes to phone company sleaze. The best example of this is AT&T warning people not to use weird looking payphones because they'll rip you off. Of course, in more than a few instances, if you take a good look at these weird looking payphones, particularly the ones that try to look like "real" ones, you'll find that they're made by AT&T.

Access to 2600

Dear 2600:

At last I've found a niche. After being confused beyond belief by those goons at *PC Week* and psyched out after thumbing through the pages of *Mondo 2000*, I've discovered that *2600* is where I belong.

I was at a bookstore, looking through gaming mags. Between a seriously misplaced *Better Homes and Gardens*, and a way outdated *Electronic Gaming Monthly*, I saw a torn page with the remnants of what looked like the numbers 2600 on it. Underneath this was printed "The Hacker Quarterly". My curiosity then got control of my body, and I investigated further. Despite the crappy condition, I paid the four bucks. When I got to the counter, the clerk told me that the store would stop carrying *2600* with the next issue. Looking at my copy, I see that it is the Autumn issue. No doubt, by now the winter issue is out and I have no place to look for it! At any rate, I sat down that night and couldn't believe what I was reading. All this talk of telephone "tricks" with the use of electronic modems made me think to myself, "Self, this is cool stuff and I want more!" I'm now thinking of subscribing. I just have one question. How come a one year subscription costs 21 bucks, when cover price is 16?

Phcod Prefect's article on getting started really spurred me on. Being an extreme beginner, I have little or no knowledge of these "boxes" that everyone seems to be referring to. You should make a "guidebook" available for the price of a back issue. This book should explain what all current readers are assumed to know, so that we (new readers and novice phreaks) don't go into this thing blind.

Kudos to Count Zero for his info on COCOT's. With his article, I was able to successfully build a combo box by making enhancements to an existing Radio Shack tone dialer. I had a hell of a time getting the materials, though. It would appear that Radio Shack employees are very reluctant to fork over their wares unless they know what they're going to be used for. When they see a fourteen-year old getting a pocket dialer, a mini toggle switch, and a little bit o' wire, something must go off in their heads. My conversation:

Radio Shack Techie: So you're into phones, huh?

Me: Me? No, not really.

Radio Shack Techie: Well, why're you getting this?

Me: It's (hmm) a Christmas present(!)

Radio Shack Salesperson: For who? Your dad?

Me: (go to hell) No, my friend wanted me to pick it up for him; I don't know why.

Radio Shack Techie: Well, you could do some pretty nasty stuff with this thing if you know how to use it.

Me: :)

Radio Shack Salesperson: Well, there ya go. Have fun.

Come on! Is it really necessary to ask all of these questions? I was afraid that if I reminded the man that it was none of his business, he would forget about the sale that was in effect that day.

Please write back your response, because I doubt that I'll be able to read about it in your mag. Under the circumstances, I don't think I'll be able to find *2600* as easily as I did last time.

The Apple II Evangelist
Palos Verdes, CA

Your problem is very easily solved. All you have to do is subscribe! It costs a little less to get us on the newsstand but there is that degree of uncertainty that you have to go through. Regarding Radio Shack, we don't know why they have to interrogate all of their customers the way they do. It's extremely annoying and has led many of us to go elsewhere. On those rare occasions when we have no choice, we always feed them bogus info. A little thing like an eight digit phone number or a zip code with a letter in it can ruin their entire day.

Rolling Stone Corrections

Dear 2600:

Reading the Autumn 1992 issue, I read through Clark Kent's nice letter on the hacker's reading list (page 28). I stopped over and picked up a copy of the *Rolling Stone* September 19, 1991 article "Samurai Hackers" and got an instant laugh.

If you'll recall the *2600* article (Winter 1990) which the *Stone* author (Lynda Edwards) cites, it wasn't at all as what she had written.

1) I am *not* a GOP staffer.

2) I was definitely *not* hired by Jeffrey Land.

3) Land did *not* hire any hackers - rather, he was one of them and I was his opposite number. I was only *hired* to do so - hence my term, "Samurai Hackers" (in memory of John Belushi, who I hope is enjoying this even as I write). In point of fact, this was the point of the article - a reference of how hackers, like the samurai of old, often work under the auspices of indifferent or ignorant powerful lords and political figures.

4) Land was soon exonerated after the legislative hearings. Although ample allegations of corruption and governmental abuse were uncovered, both parties simultaneously excused the other. Land now works as the Deputy Register of Deeds for the County of Camden. He now makes nearly $5,000 over what he previously made as a legislative staffer.

5) And for the closing act, read the *Asbury Park Press* - July 25th, 1991, editorial page A-18 on the matter of the master computer tapes being destroyed. It was, you see, the discrepancies which appeared in the master tapes which lead the entire investigation in the first place. Little or no mention elsewhere has been made of those records being destroyed.

Aside from good soldiers being rewarded, so what?

Sometimes media organs become just that - organs. I find it amusing when a large scale mass-marketed magazine as *Rolling Stone* can't even *read* verbatim what it is they're citing *correctly*. (I suspect that Ms. Edwards got her information verbally, rather than from a direct source.) If this is the case, then how can these guardians of democracy report responsibly as to what is actually going on? I agree with Mr. Goldstein's position that the media must themselves be better informed and that we had better start making sure that all aspects of The Word is put out there for all to consider and judge accordingly. Dialogue *must* continue as too much is at stake for us to keep spirit.

What good is knowledge if it's wrong?

Keep the faith, baby.

TELEgodzilla!

We couldn't agree more. And to answer your private question, the answer is yes.

Special Phone

Dear 2600:

Where can I buy a phone that has the A, B, C, and D keys on it in addition to the 0-9, *, and # keys? My two meter amateur radio has them on it. But I can only use them when I am making phone calls via an auto patch.

TL
Tempe, AZ

Modems are also capable of dialing the extra four keys. If anyone knows of regular consumer phones that have these keys, we'd like to know. It would add some extra security to voice mail, answering machines, and the like.

Seeking Virus BBS's

Dear 2600:

I just received my first copy of your magazine and last year's back issues, and I love them. I don't know if I'll ever have the guts to climb up telephone poles and do late night hacking sessions, but I have been known to poke around a few Internet sites and have a look. Your publication has already given me ideas on some new fun things to try.

I'd like to know two things: 1) Do you or your readers know how I could get into any of the virus BBS's that are out there? Every time I read an article on viruses I keep hearing about the "awful BBS's" that carry virus source. But I'll be damned if I can find one. 2) Are there people in the Rochester, NY area that would be interested in having *2600* meetings? I'd offer to try to set things up myself but I travel quite a bit and my attendance would be sporadic.

Maybe if I find some European virus BBS numbers I'll have a good reason to build the Radio Shack red box and do my BBSing for free!

YFNH
(Your Friendly Neighborhood Hacker)

There probably are people in your area interested in having meetings but somebody has to take the initiative. There are BBS's that specialize in viruses but they're kind of funny about giving their numbers out. If you succeed in your quest, you will certainly be a sight: a hacker with a laptop hooked to a payphone using a red box to connect to a European virus BBS. You just can't get more evil than that.

Cellular Magic

(continued from page 11)

```
827.550 827.580 827.610 827.640 827.670 827.700 827.730
827.340 827.370 827.400 827.430 827.460 827.490 827.520
827.130 827.160 827.190 827.220 827.250 827.280 827.310
826.920 826.950 826.980 827.010 827.040 827.070 827.100
826.710 826.740 826.770 826.800 826.830 826.860 826.890
826.500 826.530 826.560 826.590 826.620 826.650 826.680
826.290 826.320 826.350 826.380 826.410 826.440 826.470
826.080 826.110 826.140 826.170 826.200 826.230 826.260
825.870 825.900 825.930 825.960 825.990 826.020 826.050
825.660 825.690 825.720 825.750 825.780 825.810 825.840
825.450 825.480 825.510 825.540 825.570 825.600 825.630
825.240 825.270 825.300 825.330 825.360 825.390 825.420
825.030 825.060 825.090 825.120 825.150 825.180 825.210
```

Monitoring of the base sites is obviously going to be easier than monitoring the mobiles. The cell base sites are towers (usually blue) with a triangle shaped "head" on top, and sporting a couple of what appear to be vertical antennas. These base sites have a range of three to five miles. If you take a look at the honeycomb diagram, you can see how they are laid out. The cell transmitter is in the middle of the cell. It is possible to hear many, most, or all of the cells in your city, depending on your location. The closer you live to a boundary, the greater the chances of your being able to receive more cells. Due to the nature of radio signals, the actual cell shape is more or less round. However, the hexagon shape lends itself better to show how the system is laid out. With a circular coverage area, there will be some overlapping between adjacent cells.

```
      __      __
  \__/C \__/D \__
\__/G \__/A \__/
_/D \__/E \__/F \__
 \__/B \__/*C\__/
_/F \__/G \__/A \__
 \__/ D \__/E \__/
_/A \__/ B \__/C \__
 \__/   \__/   \__/
```

If, for example, you live near the asterisk (*) in the above diagram, you will be able to easily hear the G, C, E, and A cells you're near. Since the maximum practical range of a cell is three to five miles, you'll be able to hear them a bit farther away. However, due to the nature of the FM transceivers at the cell sites (they capture only the *strongest* signal), you should be able to hear all seven cells. Which one of each cell you hear will depend on your location and the strength of the received signal. In the above diagram, you'll most likely hear the F cell in the upper right, rather than the one on the left.

Mobile reception is almost a waste of time unless you have an outdoor antenna. And, since the mobile will be repeated on the cell site, it's better to listen to the cell frequencies. You may not be able to hear both sides of the conversation if you listen only to the mobile frequencies! It is useful, however, for determining which channel cell you're in. If you use the antenna that came with the scanner, mobile range will be decreased down to one or two miles. By checking the scanner readout against the cell list above (825.030 844.980 MHz), you can tell what cell the mobile is in. This is also useful on the cell site frequencies. If you hear someone say, "I'm at the corner of highway FF and 37," and you know where the cell site antenna is in that area, you can check the frequency listing above and determine what cell that antenna belongs to.

Where to Get What You Need!

Obviously, a device is needed to download all those ESN/MINs etc. off the cellular airwaves. Here's the stuff I found so far that is under $2000 (this ain't a cheap hobby).

CCS Company, P.O. Box 11191, Milwaukee, WI 53211 (414-781-2482) They sell everything you need for $300 to $400. Kits are cheaper. Their device interfaces between an 800 mhz capable scanner and your computer. Make sure you tell them you want the REVERSE model DDI. (This is what I use.)

Curtis Electro Devices, 1235 Pear Ave, Mountain View, CA 94043 (800-332-2790, Fax 415-964-3574) They sell an ESN reader for $1295 that can read ESN/MIN, etc. but only from a short distance (maximum is 30 feet). They also sell a security model for $1595 and a NAM programmer for $1195. They publish a book called NAMFAX for $179 that tells you how to re-program hundreds of different cellulars through the keypad on the handset. (Note: You can't reprogram ESN's through the keypad unless you re-write the phone's software.)

Wavetek Communications Div., 5808 Churchman Bypass, Indianapolis, IN 46203-6109 (800-245-6356 or 317-788-5965) They sell a "Cellular I.D. Tester" that's real similar to Curtis's ESN reader but supposedly has a longer range. Price: $1495.

Needham Electronics, 4539 Orange Grove Ave., Sacramento, CA 95841 (916-924-8037) They sell eprom burners for $139.95 (I bought one myself).

Motorola (800-435-5202) They sell a cellular service manual that's used in their cellular service classes for $30. Ask for the Order Fulfillment department: Item # 68-093-00a60. This manual tells it all! An absolute must to have.

Bishop Company (800-829-0572) They publish books similar to Curtis's Namfax. Send for catalog.

Cellular Security

Well, we know a properly cloned cell phone is virtually impossible to detect. Or is it? Security companies rely on matching call patterns of subscribers' histories to current use, i.e., when 200 calls to Egypt show up in a day or 80 long distance calls to Cullman, Alabama show up in a short period, all kinds of flags and whistles go off! The security companies will even keep records of people that call numbers that have been previously called by tumbled phones and flag the phone calling that number as a potential fraudulent phone. These flags can be set to go off by a number of parameters: number of long distance calls per hour/day/month, etc. Another method they use is when the real phone places a call and the tumbled phone places another call soon afterwards, but from a distance from the first call that's impossible to travel in such a short period of time. Example: At 5 pm Friday Phone A calls from Manhattan and completes call at 5:10 pm. At 5:12 pm Cloned Phone B calls from Queens. No one can travel those distances in two minutes, thus that ESN/MIN is tagged as a clone by the phone company. These databases are just now starting to be used in larger cities. Some software will track a flagged cell phone from cell site to cell site.

Common discrepancies cell company software looks for are different ESN's, manufacturer, model, SCM's, etc. that are broadcast by the cellular phone on its REVERSE channel. (If one captures all that data off the reverse channel and incorporates it in the cloned phone, detection via this method becomes nearly impossible.)

Some daring souls have been known to use fake ID and cards to subscribe to a cellular service, then burn out the phone before the first month's bill arrives to the unsuspecting real person.

Conclusion

The future for cellular fraud is wide open. As the secret software of the over 300 brands of cellular phones in existence becomes "cracked" and re-written and spread via the underground, fraud will increase like wildfire. Virtually nothing can be done to stop the informed phone phreak as he will change ESN/MIN's, etc. easily and frequently. A new era not seen since the 2600 hertz tone was discovered is just now dawning via cellular phreaking.

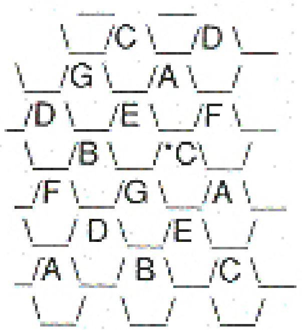
Since I'm letting the cat out of the bag for the first time here, I hereby dub the box needed to read reverse channels the BUO Box! (Shit, after 12 years I finally get to name a box.)

Cellular Magic

(continued from page 11)

827.550	827.580	827.610	827.640	827.670	827.700	827.730
827.340	827.370	827.400	827.430	827.460	827.490	827.520
827.130	827.160	827.190	827.220	827.250	827.280	827.310
826.920	826.950	826.980	827.010	827.040	827.070	827.100
826.710	826.740	826.770	826.800	826.830	826.860	826.890
826.500	826.530	826.560	826.590	826.620	826.650	826.680
826.290	826.320	826.350	826.380	826.410	826.440	826.470
826.080	826.110	826.140	826.170	826.200	826.230	826.260
825.870	825.900	825.930	825.960	825.990	826.020	826.050
825.660	825.690	825.720	825.750	825.780	825.810	825.840
825.450	825.480	825.510	825.540	825.570	825.600	825.630
825.240	825.270	825.300	825.330	825.360	825.390	825.420
825.030	825.060	825.090	825.120	825.150	825.180	825.210

Monitoring of the base sites is obviously going to be easier than monitoring the mobiles. The cell base sites are towers (usually blue) with a triangle shaped "head" on top, and sporting a couple of what appear to be vertical antennas. These base sites have a range of three to five miles. If you take a look at the honeycomb diagram, you can see how they are laid out. The cell transmitter is in the middle of the cell. It is possible to hear many, most, or all of the cells in your city, depending on your location. The closer you live to a boundary, the greater the chances of your being able to receive more cells. Due to the nature of radio signals, the actual cell shape is more or less round. However, the hexagon shape lends itself better to show how the system is laid out. With a circular coverage area, there will be some overlapping between adjacent cells.



If, for example, you live near the asterisk (*) in the above diagram, you will be able to easily hear the G, C, E, and A cells you're near. Since the maximum *practical* range of a cell is three to five miles, you'll be able to hear them a bit farther away. However, due to the nature of the FM transceivers at the cell sites (they capture only the *strongest* signal), you should be able to hear all seven cells. Which one of each cell you hear will depend on your location and the strength of the received signal. In the above diagram, you'll most likely hear the F cell in the upper right, rather than the one on the left.

Mobile reception is almost a waste of time unless you have an outdoor antenna. And, since the mobile will be repeated on the cell site, it's better to listen to the cell frequencies. You may not be able to hear both sides of the conversation if you listen only to the mobile frequencies! It is useful, however, for determining which channel cell you're in. If you use the antenna that came with the scanner, mobile range will be decreased down to one or two miles. By checking the scanner readout against the cell list above (825.030-844.980 MHz), you can tell what cell the mobile is in. This is also useful on the cell site frequencies. If you hear someone say, "I'm at the corner of highway FF and 37," and you know where the cell site antenna is in that area, you can check the frequency listing above and determine what cell that antenna belongs to.

Where to Get What You Need!

Obviously, a device is needed to download all those ESN/MINs etc. off the cellular airwaves. Here's the stuff I found so far that is under $2000 (this ain't a cheap hobby).

CCS Company, P.O. Box 11191, Milwaukee, WI 53211 (414-781-2482) They sell everything you need for $300 to $400. Kits are cheaper. Their device interfaces between an 800 mhz capable scanner and your computer. Make sure you tell them you want the REVERSE model DDI. (This is what I use.)

Curtis Electro Devices, 1235 Pear Ave, Mountain View, CA 94043 (800-332-2790, Fax 415-964-3574) They sell an ESN reader for $1295 that can read ESN/MIN, etc. but only from a short distance (maximum is 30 feet). They also sell a security model for $1595 and a NAM programmer for $1195. They publish a book called NAMFAX for $179 that tells you how to re-program hundreds of different cellulars through the keypad on the handset. (Note: You can't reprogram ESN's through the keypad unless you re-write the phone's software.)

Wavetek Communications Div., 5808 Churchman Bypass, Indianapolis, IN 46203-6109 (800-245-6356 or 317-788-5965) They sell a "Cellular I.D. Tracer" that's real similar to Curtis's ESN reader but supposedly has a longer range. Price: $1495.

Needham Electronics, 4539 Orange Grove Ave., Sacramento, CA 95841 (916-924-8037) They sell eprom burners for $139.95 (I bought one myself).

Motorola (800-433-5202) They sell a cellular service manual that's used in their cellular service classes for $30. Ask for the Order Fulfillment department. Item # 68-093-00660. This manual tells it all! An absolute must to have.

Bishop Company (800-829-0572) They publish books similar to Curtis's Namfax. Send for catalog.

Cellular Security

Well, we know a properly cloned cell phone is virtually impossible to detect. Or is it? Security companies rely on matching call patterns of subscribers' histories to current use, i.e., when 200 calls to Egypt show up in a day or 80 long distance calls to Cullman, Alabama show up in a short period, all kinds of flags and whistles go off! The security companies will even keep records of people that call numbers that have been previously called by tumbled phones and flag the phone calling that number as a potential fraudulent phone. These flags can be set to go off by a number of parameters: number of long distance calls per hour/day/month, etc. Another method they use is when the real phone places a call and the tumbled phone places another call soon afterwards, but from a distance from the first call that's impossible to travel in such a short period of time. Example: At 5 pm Friday Phone A calls from Manhattan and completes call at 5:10 pm. At 5:12 pm Cloned Phone B calls from Queens. No one can travel those distances in two minutes, thus that ESN/MIN is tagged as a clone by the phone company. These databases are just now starting to be used in larger cities. Some software will track a flagged cell phone from cell site to cell site.

Common discrepancies cell company software looks for are different ESN's, manufacturer, model, SCM's, etc. that are broadcast by the cellular phone on its REVERSE channel. (If one captures all that data off the reverse channel and incorporates it in the cloned phone, detection via this method becomes nearly impossible.)

Some daring souls have been known to use fake ID and cards to subscribe to a cellular service, then burn out the phone before the first month's bill arrives to the unsuspecting real person.

Conclusion

The future for cellular fraud is wide open. As the secret software of the over 300 brands of cellular phones in existence becomes "cracked" and re-written and spread via the underground, fraud will increase like wildfire. Virtually nothing can be done to stop the informed phone phreak as he will change ESN/MIN's, etc. easily and frequently. A new era not seen since the 2600 hertz tone was discovered is just now dawning via cellular phreaking.

Since I'm letting the cat out of the bag for the first time here, I hereby dub the box needed to read reverse channels the BOO Box! (Shit, after 12 years I finally get to name a box.)

acronyms a-g

by Echo

Here is a list of telco acronyms that I put together. I cannot take full credit however. I have to thank many in the h/p community seeing as I got much of the list from files and bulletin boards. If anyone finds this list incomplete then please send contributions to 2600

3ACC 3A Central Control
5XB COER 5 X-Bar Central Office Equipment Reports system
A/D Analog to Digital
AAX Automated Attendant eXchange
ABATS Automatic Bit Access Test System
ABHC Average Busy Hour Calls
ABS Alternative Billing Service
ABSBH Average Busy Season Busy Hour
ACB Annoyance Call Bureau
ACU Automatic Calling Unit
ADCCP Advanced Data Communications Control Procedure
ADCI Automatic Display Call Indicator
ADN Abbreviated Dialing Number
ADS Advanced Digital System
ADS Audio Distribution System
ADS Auxiliary Data System
AFACTS Automatic FACilities Test System
AFADS Automatic Force Adjustment Data System
AFSK Automatic Frequency Shift Keying
AIC Automatic Intercept Center
AICC Automatic Intercept Communications Controller
AIOD Automatic Identificated Outward Dialing
AIS Automatic Intercept System
ALBO Automatic Line BuildOut
ALFE Analog Line Front End
ALGOL ALGOrhythmic computer Language
ALI Automatic Location Indentification
ALIT Automatic Line Insulation Testing
ALRU Automatic Line Record Update
ALS Automated List Service
AM Administrative Module
AM Amplitude Modulation
AMA Automatic Message Accounting
AMACS AMA Collection System
AMARC AMA Recording Center
AMASE AMA Standard Entry
AMAT AMA Transmitter
AMATPS AMA TeleProcessing System
AMERITECH AMERican Information TECHnologies
AMPS Advanced Mobile Phone Service
AN Associated Number
ANA Automatic Number Announcement
ANC All Number Calling
ANI Automatic Number Identification
ANIF Automatic Number Identification Failure
ANSI American National Standards Institute
AOSS Auxiliary Operator Service System
AP Attached Processor
APC AMARC Protocol Converter
APS Automatic Protection Switch
AR Alarm Report
ARC Audio Response Controller
ARIS Audichron Recorded Information System
ARS Alternate Route Selection
ARSB Automated Repair Service Bureau
ARU Audio Response Unit
ASCII American Standard Code for Information Interchange
ASOC Administrative Service Oversight Center
ASPEN Automatic System for Performance Evaluation of the Network
AT Access Tandem
AT&T American Telephone and Telegraph
ATB All Trunks Busy
ATC Automatic Transmission Control
ATH Abbreviated Trouble History
ATI Automatic Test Inhibit
ATIS Automatic Transmitter Identification System
ATM Automatic Teller Machine
ATMS Automated Trunk Measurement System
ATP All Tests Pass
ATR Alternate Trunk Routing
ATRS Automated Trouble Reporting System
ATTC Automatic Transmission Test and Control circuit
ATTCOM AT&T COMmunications
ATTIS AT&T Information System
AUDIX AUDio Information eXchange
AUTODIN AUTOmatic Digital Network
AUTOSEVCOM AUTOmatic SEcure Voice COMmunications
AUTOVON AUTOmatic VOice Network
AUXF AUXiliary Frame
AVD Alternate Voice Data
B8ZS Bipolar with 8 Zero Substitution
B911 Basic 911
BAMAF BELLCORE AMA Format
BANCS Bell Administrative Network Communications System
BAPCO Bellsouth Advertising & Publishing COmpany
BCC Blocked Call Cleared
BCD Binary Coded Decimal
BCD Blocked Call Delayed
BCS Batch Change Supplement
BDT Billing Data Transmitter
BEF Band Elimination Filter
BELLCORE BELL COmmunications REsearch
BER Bit Error Rate
BERT Bit Error Rate Test
BETRS Basic Exchange Telecommunications Radio Service
BHC Busy Hour Calls
BISP Business Information System Program
BITNET Because-It's-Time NETwork
BLDS Busy Line/Don't Answer
BLF Busy Line Field
BLS Business Listing Service
BLV Busy Line Verification
BNR Bell National Research Corporation
BNS Billed Number Screening
BOC Bell Operating Company
BOR Basic Output Report
BORSCHT Battery, Overvoltage, Ringing, Supervision, Coding, Hybrid Testing
BOS Business Office Supervisor
BOSS Billing and Order Support System
BOT Beginning Of Tape
BPI Bits Per Inch
BPOC Bell Point Of Contact
BPS Bits Per Second
BPSS Basic Packet Switching Service

BRAT Business Residence Account Tracking system
BRCS Business Residence Custom Service
BRI Basic Rate Interface
BRM Basic Remote Module
BS Banded Signaling
BSA Basic Serving Arrangements
BSBH Busy Season Busy Hour
BSC Business Service Center
BSCM 8/Synchronous Communications Module
BSE Basic Service Elements
BSF Bell Shock Force
BSOC Bell Systems Operating Company
BSP Bell System Practice
BSRFS Bell System Reference Frequency Standard
BST Basic Services Terminal
BSTJ Bell System Technical Journal
BT Bus Terminator
BTAM Basic Telecommunications Access Message
BTL Bell Telephone Laboratories
BTN Billing Telephone Number
BTU British Thermal Unit
BVA Billing Validation Application
BVC Billing Validation Center
BWM Broadcast Warning Message
BWT Broadcast Warning TWX
BWTS BandWidth Test Set
CA CAble
CABS Carrier Access Billing System
CAC Calling card Authorization Center
CAC Carrier Access Code
CAC Circuit Administration Center
CAC Customer Administration Center
CAD Computer-Aided Dispatch
CADV Combined Alternate Data/Voice
CAI Call Assembly Index
CAIS Colocated Automatic Intercept System
CALRS Centralized Automatic Loop Reporting System
CAMA Centralized Automatic Message Accounting
CAROT Centralized Automatic Reporting On Trunks
CAS Circuit Associated Signaling
CAS Computerized Autodial System
CAT Craft Access Terminal
CATLAS Centralized Automatic Trouble Locating and Analysis System
CBS CrossBar Switching
CBX Computerized Branch eXchange
CC Central Control
CC Common Control
CC Country Code
CCC Central Control Complex
CCC Computer Control Center
CCH Connections per Circuit per Hour
CCIR Comite' Consultatif International des Radio Communications
CCIS Common Channel Interoffice Signaling
CCITT Comite' Consultatif International Telegraphique et Telephonique
CCNC Common Channel Network Controller
CCNC Computer/Communications Network Center
CCR Customer-Controlled Reconfiguration
CCS Common Channel Signaling
CCS Hundred (C) Call Seconds
CCSA Common-Control Switching Arrangement
CCT Central Control Terminal
CCTAC Computer Communications Trouble Analysis Center
CCU COLT Computer Unit
CCV Calling Card Validation
CDA Call Data Accumulator
CDA Coin Detection and Announcement
CDAR Customer Dialed Account Recording
CDCF Cumulative Discounted Cash Flow
CDF Combined Distributing Frame
CDI Circle Digit Identification
CDO Community Dial Office
CDPR Customer Dial Pulse Receiver
CDR Call Dial Rerouting
CDS Craft Dispatch System
CEF Cable Entrance Facility
CEI Comparably Efficient Interconnection
CEV Controlled Environment Vault
CF Coin First
CFCA Communications Fraud Control Association
CFR Code of Federal Regulations
CGN Concentrator Group Number
CIC Carrier Identification Code
CICS Customer Information Control System
CII Call Identity Index
CIS Customized Intercept Service
CLASS Centralized Local Area Selective Signaling
CLASS Custom Local Area Signaling Service
CLDN Calling Line Directory Number
CLEI Common-Language Equipment Identification
CLI Calling Line Ident
CLID Calling Line IDentification
CLLI Common Language LocaTion Identification
CMAC Centralized Maintenance and Administration Center
CMC Construction Maintenance Center
CMDF Combined Main Distributing Frame
CMDS Centralized Message Data System
CMS Call Management System
CMS Circuit Maintenance System
CMS Communications Management Subsystem
CMS Conversational Monitoring System
CMT Cellular Mobile Telephone
CMU COLT Measurement Unit
CN Change Notice
CN/A Customer Name/Address
CNA Communications Network Application
CNAB Customer Name/Address Bureau
CNCC Customer Network Control Center
CNI Common Network Interface
CNMS Cylink Network Management System
CNS Complimentary Network Service
CO Central Office
COAM Customer Owned And Maintained
COC Circuit Order Control
COCOT Customer Owned Coin-Operated Telephone
CODCF Central Office Data Connecting Facility
CODEC COder-DECoder
COE Central Office Equipment
COEES COE Engineering System
COLT Central Office Line Tester
COMSAT COMmunications SATellite
CONN CONNector
CONTAC Central Office NeTwork ACcess
CONUS CONtinental United States
CORNET CORporate NETwork
COSMIC COmmon Systems Main InterConnection frame system
COSMOS COmputerized System for Mainframe OperationS
COT Central Office Terminal
CP Control Program
CPC Cellular Phone Company
CPC Circuit Provisioning Center
CPD Central Pulse Distributor
CPE Customer Premises Equipment
CPH Cost Per Hour

CPI Computer Private branch exchange Interface
CPM Cost Per Minute
CPMP Carrier Performance Measurement Plan
CPU Central Processing Unit
CRAS Cable Repair Administrative System
CRC Customer Record Center
CRC Cyclic Redundancy Check
CREG Concentrated Range Extension with Gain
CRFMP Cable Repair Force Management Plan
CRIS Customer Record Information System
CRS Centralized Results System
CRSAB Centralized Repair Service Answering Bureau
CRT Cathode Ray Tube
CSA Carrier Serving Area
CSACC Customer Service Administration Control Center
CSAR Centralized System for Analysis Reporting
CSC Cell Site Controller
CSDC Circuit Switched Digital Capability
CSNET Computer Science NETwork
CSO Central Services Organization
CSS Computer Sub-System
CSU Channel Service Unit
CTC Central Test Center
CTM Contac Trunk Module
CTMS Carrier Transmission Measuring System
CTO Call Transfer Outside
CTSS Cray Time Sharing System
CTT Cartridge Tape Transport
CTTC Cartridge Tape Transport Controller
CTTN Cable Trunk Ticket Number
CU Control Unit
CU Customer Unit
CU/TK Common Update/EQuipment system
CUCRIT Capital Utilization CRITeria
CVR Compass Voice Response
CWC City Wide Centrex
D/A Digital to Analog
DA Directory Assistance
DACS Digital Access Cross-connect System
DACS Directory Assistance Charging System
DAIS Distributed Automatic Intercept System
DARC Division Alarm Recording Center
DARU Distributed automatic intercept system Audio Response Unit
DAS Directory Assistance System
DAS Distributor And Scanner
DAS WDT Distributor And Scanner Watch Dog Timer
DASD Direct Access Storage Device
DAV Data Above Voice
DB Decibel
DBA Data Base Administrator
DBAC Data Base Administration Center
DBAS Data Base Administration System
DBM DataBase Manager
DBS Duplex Bus Selector
DCCS DisContiguous Shared Segments
DCE Data Circuit terminating Equipment
DCH D Channel Handler
DCL DEC Control Language
DCLU Digital Carrier Line Unit
DCM Digital Carrier Module
DCMS Distributed Call Measurement System
DCMU Digital Concentrator Measurement Unit
DCP Duplex Central Processor
DCPR Detailed Continuing Property Record (PICS/DCPR)
DCPSK Differential Coherent Phase-Shift Keying
DCS Digital Crossconnect System
DCT Digital Carrier Trunk
DCTN Defense Commercial Telecommunications Network
DCTS Dimension Custom Telephone Service
DDC Direct Department Calling
DDD Direct Distance Dialing
DDN Defense Data Network
DDS Digital Data Service
DDS Digital Data System
DDS Digital Dataphone Service
DDX Distributed Data eXchange
DEC Digital Equipment Corporation
DERP Defective Equipment Replacement Program
DES Data Encryption Standard
DEW Distant Early Warning (line)
DFI Digital Facility Interface
DFMS Digital Facility Management System
DIC Digital Interface Controller
DID Direct Inward Dialing
DIF Digital Interface Frame
DIM Data In the Middle
DIP Dual In-Line Package
DISA Direct Inward System Access
DIU Digital Interface Unit
DLC Digital Loop Carrier
DLCU Digital Line Carrier Unit
DLL Dial Long Lines
DLS Digital Link Service
DLTU Digital Line/Trunk Unit
DLU-PG Digital Line Unit-Pair Gain
DM Delta Modulation
DMA Direct Memory Access
DMI Digital Multiplexed Interface
DML Data Manipulation Logic
DMS Data Management System
DMS Digital Multiplexed System
DMU Data Manipulation Unit
DN Directory Number
DNC Dynamic Network Controller
DNHR Dynamic Non Hierarchical Routing
DNIC Data Network Identification Code
DNR Dialed Number Recorder
DNX Dynamic Network X connect
DOC Dynamic Overload Control
DOCS Display Operator Console System
DOJ Department Of Justice
DOM Data On Master group
DOTS Digital Office Timing Supply
DOV Data Over Voice
DP Demarcation Point
DP Dial Pulse
DPAC Dedicated Plant Assignment Center
DPC Destination Point Code
DPE Data Path Extender
DPN-PH Data Packet Network Packet Handler
DPP Discounted Payback Period
DPSK Differential Phased Shift Keying
DR Data Ready
DR Data Receive
DRMU Digital Remote Measurement Unit
DS Digital carrier Span
DS Digital Signal
DS Direct Signal
DSBAM Double-SideBand Amplitude Module
DSDC Direct Service Dial Capability
DSI Digital Speech Interpolation
DSN Digital Signal (level) N
DSP Digital Signal Processor
DSR Dynamic Service Register
DSS Data Station Selector
DSU Data Service Unit
DSX Digital System X-connect

DT Data Transmit
DT Di-group Terminal
DTAS Digital Test Access System
DTC Di-group Terminal Controller
DTC Digital Trunk Controller
DTE Data Terminal Equipment
DTF Dial Tone First
DTG Direct Trunk Group
DTIF Digital Transmission Interface Frame
DTMF Dual Tone Multi Frequency
DTU Di-group Terminal Unit
DUV Data Under Voice
DVX Digital Voice eXchange
E&M rEceive & transMit/Ear & Mouth signaling
E-COM Electronic Computer Originated Mail
E911 Enhanced 911
EADAS Engineering and Administrative Data Acquisition System
EADAS/NM EADAS/Network Management
EAEO Equal Access End Office
EARN European Academic Research Network
EAS Extended Announcement System
EAS Extended Area Service
EASD Equal Access Service Date
EBCDIC Extended Binary Coded Decimal Interexchange Code
ECAP Electronic Customer Access Program
ECC Enter Cable Change
ECCS Economic C (hundred) Call Seconds
ECF Enhanced Connectivity Facility
ECPT Electronic Coin Public Telephone
ECS Electronic Crossconnect System
EDAC Electromechanical Digital Adapter Circuit
EDI Electronic Data Interchange
EDP Electronic Data Processing
EDSX Electronic Digital Signal X-connect
EECT End to End Call Trace
EEDP Expanded Electronic tandem switching Dialing Plan
EEHO Either End Hop Off
EEI Equipment-to-Equipment Interface
EFRAP Electronic Feeder Route Analysis Program
EIA Electronics Industries Association
EIS Expanded Inband Signaling
EISS Economic Impact Study System
EKTS Electronic Key Telephone Sets
EML Expected Measured Loss
EMS Expanded Memory Specification
ENFIA Exchange Network Facility for Interstate Access
EO End Office
EOE Electronic Order Exchange
EOS Extended Operating System
EOTT End Office Toll Trunking
EPL Electronic switching system Program Language
EPROM Erasable Programmable Read-Only Memory
EPSCS Enhanced Private Switched Communication Service
ER Error Register
ERAR Error Return Address Register
EREP Environmental Recording Editing and Printing
ERL Echo Return Loss
ERP Effective Radiated Power
ERU Error Return address Update
ESAC Electronic Surveillance Assistance Center
ESB Emergency Service Bureau
ESF Extended SuperFrame
ESL Emergency Stand Alone
ESN Electronic Serial Number
ESN Electronic Switched Network
ESP Enhanced Service Provider
ESS Electronic Switching System
ESSX Electronic Switching System eXchange
ETAS Emergency Technical ASsistance
ETF Electronic Toll Fraud
ETN Electronic Tandem Network
ETS Electronic Tandem Switching
ETS Electronic Translation System
ETSACI Electronic Tandem Switching Administration Channel Interface
ETSSP ETS Status Panel
FA Fuse Alarm
FACS Facilities Assignment and Control System
FAR Federal Acquisition Regulation
FAST First Application System Test
FAT File Allocation Table
FCAP Facility CAPacity
FCC Federal Communications Commission
FCC Forward Command Channel
FCG False Cross or Ground
FCS File Control Systemction
FCS Frame Check Sequence
FDM Frequency-Division Multiplexing
FDP Field Development Program
FDX Full DupleX
FED Far End Data
FEMF Foreign Electro-Motive Force
FEPS Facility and Equipment Planning System
FEV Far End Voice
FGA Feature Group A
FGB Feature Group B
FGC Feature Group C
FGD Feature Group D
FIFO First In, First Out
FIOC Frame Input/Output Controller
FIP Facility Interface Processor
FIPS Federal Information Processing Standards
FM Frequency Modulation
FMAC Facility Maintenance And Control
FNPA Foreign Numbering Plan Area
FOC Fiber Optic Communications
FON Fiber Optics Network
FR Flat Rate
FRS Flexible Route Selection
FSK Frequency Shift Keying
FTG Final Trunk Group
FTP File Transfer Protocol
FTS Federal Telecommunications System
FX Foreign eXchange
GBS Group Bridging Service
GCS Group Control System
GEISCO General Electric Information Services COmpany
GHZ GigaHertZ
GID Group ID
GND GrouND
GOD Global Outdial
GOS Grade Of Service
GP Group Processor
GPIB General Purpose Interface Bus
GRD GRounD
GRP MOD GRouP MODulator
GSA General Services Administration
GSAT General telephone and electronics SATellite corporation
GTC General Telephone Company
GTE General Telephone Electronics
GTT Global Title Transmission

Looks like that's all we can fit for now. But the second half will be even more thrilling!

A STUDY OF HACKERS

by Dr. Williams

In *The Hacker's Handbook* on page 123, Hugh Cornwall discussed an idea of setting up his home computer system to look and act like a mainframe system. He would let hackers attempt to gain access to it while he monitored the results. He wanted his home system to emulate the M15, the most notorious hacking target for British hackers. The hackers would get into the system and attempt to gain privileges, when unknowingly they were really trying to get into his system. Hugh did not carry out the plan, even though he did set up a sophisticated emulation of the M15. About the time he was to carry out his plan, a disgruntled employee left the M15 crew, and went to the News hanging out all of the dirty laundry. Hugh thought carrying out the stunt may get him into trouble, or at least more publicity than he wanted, so he didn't go through with it.

I just carried out this idea myself, and I thought the results were interesting.

I had just completed a class in operating systems. The class used MINIX as a model to study and modify. MINIX is an operating system compatible with version 7 of UNIX, specifically made to be run on IBM and its clones. It has over 12,000 lines of source code written in C. After finishing the class, I decided to use MINIX because I thought it could best mimic a big computer system under the guise of UNIX.

It took me a while to build an appropriate "pseudo-system", one that I thought was capable of fooling novice users of UNIX into thinking they were indeed on a UNIX system. It would have been beyond the capacities of my machine to do all that was necessary to fool expert users of UNIX though, not to mention the time constraints I had. First I had to reformat my hard drive for the MINIX operating system. Then I had to write a device driver to run the modem, which took a while to do. I had to change physical appearances: names of file, directories, syntax of items, and emulation style. I added some characteristics - putting in games, files with interesting names, eye catching items, and additional mail facilities. Finally, I wrote the program which did the actual mimicking, which also gathered statistics of the users' activities. Overall, I spent six months worth of free time making a satisfactory system.

The program was made to imitate UNIX in all regards. At various times, it would 'show' different users on, different processes being run, disk quota, terminal statistics, free spaces, printer job status, and so on. It showed different disk packs, had most of the files which UNIX uses for system and administrative functions, and backup schedules.

On the login screen, I was tempted to put something like "Boeing node #2, please login", or "General Dynamics Site 3, spot 2". However, I thought this could get me more trouble or attention than I wanted, so I settled for a more generic approach:

```
BN Site #2
«current time»
please log in:
```

After login the first screen would show:

```
**************************************************
There was a crash on /group3 on 6/8/89 at
approximately 03:00. Some files from that
location have been deleted. Please inspect
your account for file integrity. Call the
operators at ext. 3524 if you need to get any
files from backups. There will be a gathering
on 6/24/89 at noon in the cafeteria during
lunch for all employees wishing to form a
group of people interested in remote control
cars and planes. Please call Jeff Smith at ext
2146 for further details.
**************************************************
```

And the prompt was:

```
June[1]
```

Every time a command was entered, the number in the square brackets was incremented by one.

In the program, I left in some famous UNIX bugs, hoping somebody would try to manipulate the account into getting more privileges. I left in mail bugs, writing commands to the 25th line, and using the same encryption scheme for the password file which UNIX uses, and a few other smaller items. To egg them on, I put in games which could only be executed with privileges, and files with tempting names like CAR.DATA, PRIVATE.DOC, and DOCUM.SECRT which also could only be read with privileges. Every time the account logged off, I returned most things back to the original setting, including any gains they had made. So if a person logged on more than once, they had to start from scratch every time. I didn't like doing this, but since I thought a lot of people would be using a few accounts, I thought it would look more phony if the account drastically changed every time the person logged onto it. It also helped me make more accurate observations. At this time, I got a friend to agree to give up his dorm room phone for a few months, since he was taking off anyway. So I plugged the computer into there and let 'er rip.

I wanted to put the accounts into three different targets: hackers, hacker wanna-be's, and the academic community. On the bulletin boards which I had hacker privileges on, I posted a message telling users to call this "neat" system I discovered. The message went something like:

"I recently discovered an account to a UNIX system at 555-5555.

The account name is 'PAULS', with password 'dog$car'.

Have fun!"

A day later, I posted the same sort of message on different bulletin boards, those which I had only a normal status on, but where there were more "kiddies" on. I changed the account name and password. Finally, a week later, I told some of my friends by word of mouth in the academic community, but with another different account/password combination.

Something that I predicted would happen is that a lot of the sysops whose system I had posted the message aimed for the "kiddies" erased the message. Over half of them had erased the message in less than a few hours. The other half had the message erased in about a day. It still served my purpose though, because a lot of people had seen the message. I was tempted to tell the sysops whose system I had posted the message on that it was all a hoax - an experiment, but I thought some of them wouldn't keep the lid on that information.

Something which I sort of expected was that a lot of the sysops wrote me mail back, furious that I had posted that message. Most of them thought I was putting them in legal jeopardy (understandably). Others said that their board was not into that type of information, threatened to call the police, warned me to never post that type of message again, and even deleted my account (no loss). None of the messages to the hacker crowd were lost. I posted the message 17 times for the kiddies, five times for the hackers, and told four friends who I know passed it on to a few other people.

I suppose if somebody would have thought about it, he or she might have concluded that it's pretty hokey to post an account/password combination on a public BBS room where everybody can read it. Either I had to be really arrogant, or have ulterior motives.

Within eight hours of posting the message, the system got its first call. I was really hoping that it would be somebody who knew what they were doing. I wanted to see if anyone was going to be able to jump the hoops I set up to gain further privileges. The first person didn't seem to be familiar with the UNIX operating system - they kept on trying MS-DOS commands. They couldn't do a disk directory, or any other basic operations in UNIX. In fairness, if you're not used to UNIX, it is pretty user unfriendly.

The next few callers seemed to know more about what was going on. They were logged on under the hackers' account. They were able to find out the attributes of the account, get a view of what the overall system looked like, and see what the range of the system was. A few of those were able to locate some of the targets of interest I put in, but did not gain access.

Next, the kiddies' account took a big jump in usage. The majority of them were unfamiliar with the UNIX system. Some of them had a cursory knowledge of the basic UNIX commands, but didn't really know how to manipulate the machine.

Finally, a few calls started coming in on the academic account. Most of them didn't spend too long on the account. Since they knew more about what was going on, they took a look to see what was around and split. One or two of them tried using some of the more sophisticated commands which work on UNIX, but not on MINIX.

Over a two month period, I was able to see what the overall attributes of usage were. I don't know how many unique individuals logged into the account, but I did keep track of how many times the account was used. By looking at the log of commands from the kiddie account, about half of its usage came from people unfamiliar with UNIX. Using MS-DOS commands or commands of other PC's, inability to access the help file, and no experience with the UNIX environment were characteristic of these users. Approximately a quarter of the usage came from people who had exposure to UNIX with a basic knowledge. They were able to find out the basic structure of the account and system, wander around a bit, but did not do anything sophisticated. The last quarter had at least competent users; some where quite expert. They were able to discover items of interest, find most items of importance, gain further privileges, and attempt to hide the account that had been used.

From the 50 percent of users who were UNIX competent, only one third of them tried to gain privileges. The other two thirds must have been content where they were at. Of the others, the most popular scheme used to gain privileges was to read the password file (which, like in UNIX, is publicly readable but encrypted). This was not a bit surprising to me, since the Cornell Worm used essentially the same method. Many articles have talked about it, some showing how in a cookbook recipe manner the steps were taken. Users would try to decrypt the password file and gain the root password. The next most common method was written commands to the 25th line of a more privileged account. This wasn't surprising either, since much ado has been made about that. The rest seemed to be evenly spread around on mail bugs, finding bugs in commands which ran shells in privileged modes, or some other method.

From the third of the users left over, 32 percent of them succeeded in raising the account's privileges. Out of that 32 percent, 68 percent of the people were able to get at least operator privileges. Out of that 68 percent, 18 percent (25 people) were able to get root privileges. I didn't know though if that was one person who got root privileges 25 times, or 25 different people. The program I had written really only mimicked the root privilege, and did not allow total control of the machine.

The sophistication of the user was directly related to the amount of "stupid" things the user did. Some of the kiddies did some real stupid things, like creating files saying something like, "Ha. Ha. I'm a hacker and I'm in your system", deleting files, or editing files in an obvious manner. Others romped around the system, checking out every file in every sub directory. Other items which were not as obvious were using the help files excessively, entering many incorrect commands consecutively, and continually trying to access items for which they had insufficient privileges. The most knowledgeable users tried to hide their presence. Some of them successfully edited the user log without leaving a trace, kept a low profile of activities, and did not play the games at all or for great lengths of time. Out of those who gained privileges, there was only one incidence of someone deleting a file on purpose without cause.

Overall, the kiddie account logged in 2,017 users. The hacker account logged 1,432 users, and the academic account logged 386 users. I have no way of knowing though how many unique people used the accounts. I was disappointed at the low turnout from the academic community. I talked to somebody I had given the account to, and some of the reasons seemed to be that some people just weren't into hacking, had legitimate accounts, were not curious about other systems, and just didn't want to risk getting into trouble.

Overall, the most incompetent users came from the kiddie account. The hacker account seemed to be most familiar with all of the system weaknesses, but lacked an overall understanding of the system. The academic account was just the opposite; they knew how to work the system, but did not know of the security shortcomings of UNIX. However, the best users came from the academic account, where there was probably an elite crust of students who are also hackers.

One side effect came shortly after I posted the original message on BBS's. Soon, other people started posting the kiddie account/password combo, claiming they got it from a friend or had "hacked" it themselves. That's why when the sysops deleted my message, I wasn't worried, because enough people had seen it to spread the word around.

I half expected some law agency to raise an eyebrow and look into the matter. After all, I had done a pretty blunt thing. I did not get any questions about it though, nor did the person who owned the phone number. But then again, maybe somebody did, and I just didn't find out about it.

ALL LIFETIME SUBSCRIBERS TO 2600 WILL NOW RECEIVE 1984, 1985, AND 1986 BACK ISSUES. IF YOU'RE A CURRENT LIFETIME SUBSCRIBER, CONTACT US IF YOU WANT THESE BACK ISSUES.

2600 marketplace

COMPLETE 300+ PAGE *TAP* BACK ISSUE SET. NOT photo-reduced $35; *TEL* back issue set $10. cellular phone modification and conversion manual $8. Peregrine Dynamics, PO Box 702, Kent, Ohio 44240.

MEET THE ESTABLISHMENT. Plan your calendar, scholarships available. The second annual international symposium on "National Security & National Competitiveness: Open Source Solutions" will take place in the Washington DC area the week of 2 November 1993. Cyberspace pilots and hackers in demand as speakers and to display good "hacks" pertinent to finding, collating, and presenting information useful to decision-makers. Hackers are a national resource - but the policy-makers and business barons (e.g. those uninformed by *Forbes*) need to understand this. Come strut your stuff, awe the uninitiated, have a good time. To discuss further, communicate with steeler@well.sf.ca.us or fax to (703) 536-1776.

LOOKING FOR OLD TELCO VANS for purposes too illicit to mention here. Contact BoB - (516) 751-2600.

WANTED: Any "good" text philes (*2600* related). Will pay money. Contact me on Private Idaho BBS (208) 338-9227.

DEAD PROGRAMMERS SOCIETY BBS (514) 699-7091. Seize the day. Canada's gateway.

CALLER ID'S $39.95 PPD. Surveillance, counter surveillance equipment. Catalog $5. Dealer wanted. EDE, PO Box 337, Buffalo, NY 14226.

STUDENT HACKER seeks any and all information, plans, magazines, books, schematics, etc. related to hacking, phreaking, electronics, computers, phones, cable TV. Willing to exchange any information I find from my own research. Also looking for any single issue of *TAP* and *Wired* Magazine. Write: J.C.B., 5015 Club View Drive, Concord, NC 28025.

SCANNER FOR SALE: Bearcat 800XLT (includes cellular). Excellent condition. Original box/papers, 20 hours on time. $185 insured UPS to your door. $35 for 800 MHz/cellular ground-plane antenna. Call/leave message for Jon (213) 344-3158.

THE PERFECT PORTABLE HACKING COMPUTER! NEC Ultralite Notebook Computer, 640k RAM, BACKLIT LCD. It also has a Solid State 1 Mb Silicon Disk. ALL THIS ONLY WEIGHS 4.4 LBS! Factory Refurb. Only $500!! Free built-in 2400 baud modem. For a 2mb Silicon disk add $50. For an external Disk Drive, add $50. Supplies LIMITED! Send Check or M.O + $7.50 S/H. C.O.D avail, add $4.00. AI Technologies, Inc., P.O. Box 1053, Poughkeepsie, NY 12602-1053.

THE GOLDEN ERA REBORN! Relive the thrill of the golden era of hacking through our exclusive collection of H/P BBS Message Bases. Posts from over 40 of the most popular boards such as 8BBS, OSUNY, PLOVERNET, LOD, PHOENIX PROJECT, and more. Available in IBM, Amiga, & Macintosh formats. Send for the listing by: Email: lodcom@mindvox.phantom.com. Snail Mail: LOD Communications, 603 W. 13th St., Suite 1A-278, Austin, TX 78701. Voice Mail: 512-448-5098.

IMPRISONED UNDERGROUND ENTHUSIAST seeking correspondent. Also seeking hardcopy: cyber-related publications and Usenet feeds. Please write Shrike c/o 7881 Crossfox, Boise, ID 83706.

AMIGA 2000, digitizer, RAM expander/HD controller, midi, modem, extra floppy, software. $2000/best offer. (413) 528-7627.

THIS MACHINE IS BROKEN stickers. Fluorescent red, made to last. For all of the broken machines in your life. $5 per hundred. 2600 Stickers, PO Box 752, Middle Island, NY 11953.

TAP BACK ISSUES, complete set Vol. 1-91 of QUALITY copies from originals. Includes schematics and indexes. $100 postpaid. Via UPS or First Class Mail. Copy of 1971 Esquire article "The Secrets of the Little Blue Box" $5 & large SASE w/52 cents of stamps. Pete G., PO Box 463, Mt. Laurel, NJ 08054. We are the Original!

Marketplace ads are free to subscribers! Send your ad to: 2600 Marketplace, PO Box 99, Middle Island, NY 11953. Include your address label. Ads may be edited or not printed at our discretion. Deadline for Summer issue: 5/15/93.

Getting your file...

by Rayonet

There exists, somewhere, a file on you. Maybe you know about it, maybe you don't. It's there either way. As some Greek guy once said, Know Thyself. At the very least, know what they know.

The following addresses are useful for getting your credit records. Call or write, and they'll probably be "kind" enough to walk you through the process of getting one. For a fee.

Equifax Credit Information Services
Box 740241
Atlanta, GA 30374-0421
800-685-1111

Your credit history is available for $3 in Maine and Montana, $5 in Maryland, $10 in Massachusetts, free in Vermont, $8 in all other states.

TRW Consumer Complimentary Report
Box 2350
Chatsworth, CA 91313-2350
214-235-1200 (Dallas HQ)

(This is the address to use if you have not been denied credit in the past sixty days.)

Your credit history is available for free, one copy a year.

TRW Consumer Assistance Center
Box 749029
Dallas, TX 75374
214-235-1200

(This is the address to use if you have been denied credit in the past sixty days.)

Also free, also only one copy a year.

Trans Union Corp.
Box 7000
North Olmsted, OH 44070
216-779-2378

Free if you've been denied credit in the past sixty days. Otherwise, $15 for an individual account record, $30 for a joint account record.

Keep in mind, requesting copies of your credit history affects your credit history negatively! I guess they figure if a lot of people are checking you out, there must be some cause for concern. If you do this at all, do it once a year. Also a keen way to blow someone's credit rating, though the volume at which you'd have to do it would become ridiculous.

~

The next address is for medical information. Unlike requesting credit reports, this shouldn't adversely affect your rating.

Medical Information Bureau
Box 105
Essex Station
Boston, MA 02112
617-426-3660

Free, believe it or not.

~

Now for the fun stuff. Use these next addresses to get information about your criminal record, or just to see if the feds have you listed as someone worth watching. Incidentally, if you *don't* have a record with them, requesting copies of one will make them *start* one. Again, I guess the reasoning is if you ask, you must have something to hide.

Federal Bureau of Investigation
Attn: Freedom of Information Section
10th St. and Pennsylvania Ave., NW
Washington, DC 20535
202-324-5520

This is the address to use if you do not have a criminal record.

The first 100 pages are free, but then it's $0.10 a page. If your report is more than 100 pages long, well... bully for you.

Federal Bureau of Investigation
Identification Div., Rm. 10104
10th St. and Pennsylvania Ave., NW
Washington, DC 20535
202-324-2222

This is the address to use if you do have a criminal record:

This costs you seventeen bucks, because crime (after all) doesn't pay. Criminals do.

~

The least interesting, but by no means least useful, address is the next one, for Social Security information.

Social Security Administration
Wilkes-Barre Data Operations Ctr.
Box 20
Wilkes-Barre, PA 18767-0020
800-772-1213

This is free. Since it's also a government office, I'd request a report three or four times a day. Get the most bang for your taxpayer buck, but please... recycle all that paper.

Lawsuit Filed Against Secret Service

Action is Taken on Behalf of DC 2600 Meeting

The Secret Service may have thought that harassing a motley crew of hackers in a shopping mall would have resulted in nothing more than the intended goal of sending them scurrying back to their underground hideouts, fearfully awaiting a knock at the door. But when the Washington D.C. *2600* meeting was detained, searched, and ejected from Pentagon City mall by mall security officials, seemingly acting on behalf of the Secret Service, we knew exactly where to go: to the press and the lawyers.

Since the incident, articles have appeared in the trade journal *Communications Daily*, the *Washington City Paper*, even a front-page story in the *Washington Post*. This is in addition to an uncountable number of pieces throughout the Internet and over bulletin boards. This was certainly more attention than anyone at the Secret Service could have anticipated.

Unfortunately for them, they were not even allowed to slink away, red-faced at their botched job. Computer Professionals for Social Responsibility, whose membership applications were seized at the November meeting, were the first to express interest in our predicament. The Electronic Frontier Foundation and the American Civil Liberties Union would soon follow in offering their legal counsel.

CPSR filed two Freedom of Information Act requests with the Secret Service on behalf of several meeting-goers who were interested in possible legal action against the perpetrators of the "raid". The Secret Service returned the requests, saying that they had no information on any of the meeting-goers. This immediately raised suspicion, as the mall security personnel collected everyone's name and phone number at the November meeting. Presumably this information was on file somewhere. Also, one of the meeting-goers had been visited by the Secret Service about two years ago, completely unrelated to anything computer-oriented. Presumably a file was created on him at that time, and yet the Secret Service said they had no information on anyone involved. Thirdly, one of the meeting-goers was visited by the Secret Service subsequent to the meeting. During this visit, one of the agents made reference to his name being on "the mall list". It seems highly unlikely that the Secret Service had absolutely no information on any of the people on whose behalf CPSR filed FOIA requests.

Acting on these strong suspicions, on February 4th, CPSR filed suit against the Secret Service for failing to provide information requested under the Freedom of Information Act. The SS has thirty days to respond.

All of this is mainly a preliminary game of legal hide-and-seek to establish what role, if any, the Secret Service and other government agencies might have played in the November *2600* raid. Once everyone involved stops contradicting each other and a clearer image forms of who was behind the harassment, we can begin to consider other possible legal avenues to send the Powers That Be a strong message about what to expect when trying to intimidate a group of hackers.

Stay tuned.

2600 ROBBED OF TOUCH TONES

All right, it isn't all that much of a story. But it is worthy of note that for nearly ten years, we've enjoyed the use of our touch tone phones here at the 2600 offices. But several months after our central office was cut over from a crossbar to a #5 ESS digital switch, we found that all of our touch tone phones no longer cut the dialtone. You see, we have steadfastly refused to pay a surcharge New York Telephone levies on anyone who uses a touch tone phone. The charge is small (under $2 a month) but it's the principle. It's a fact that there is no special equipment needed to process touch tones. Quite the contrary, it takes special equipment to ignore touch tones! It's nothing short of blackmail. Our phones still generate tones that are perfectly usable - only not for dialing. Fortunately, it wasn't hard at all to switch everything - phones, computers, fax machine - to pulse dial. It takes longer to dial and the more 9's and 0's we generate, the more we tie up New York Telephone's equipment. Their loss, not ours.

To give you an idea of the absurdity of the situation, this is what New York Telephone has to enter into their computer to stop ignoring our touch tones:

```
RCV:APPTEXT
FORM=1V8&CHG,TN=7512600,TTC=Y,END
```

They want to charge us $16 to type that.

British News

by The Dark Knight

Sex, Lies, and Audiotape

The government clampdown on telephone chatlines appears to have had an unfortunate effect on innocent telephone services.

Infosale, a West Country telephone sales business, may have to close after a judge ruled that its adult dating service was a type of chatline. As such, Infosale would have to pay 20,000 pounds towards a scheme to compensate BT customers who found their phone bills had rocketed because their children were constantly telephoning chatlines.

Anthony Chappell, proprietor of Infosale, said the 20,000 pound bill would push his company into receivership. But worse still, Chappell said the regulations on chatlines would force him to record his customers' dating conversations. Chappell said the recordings would include the most intimate details.

On hearing this there are undoubtedly hundreds of *2600* readers wincing in horror at the realisation that every time they ring an adult dating service their every word is being taped. I consider this to be an outrageous invasion of privacy, and hope that there will be a change in the law.

Keeping The Poles Apart

BT engineers are up in arms about telegraph poles. They have refused to climb non-union poles which had been fitted by private firms in London and the Midlands.

It is a protest about changes to traditional working practices. The engineers had previously replaced old poles with new ones, but left the old poles to be collected at another time. This meant that they were paid twice for visiting the same site.

A compromise scheme is now in place whereby the engineers have agreed to pilot a bold new initiative dreamed up by BT.

They will collect the old poles at the same time as the new ones are fitted!

All Down To Those Family Connections

How many of you have experienced the pleasures of contacting BT's accounts department about that phone bill you know you've paid, but BT's computer says you haven't?

Sarah Carsberg was sent a final reminder and one of those friendly letters advising you that your connection is in danger of being severed if you don't cough up. She obligingly delivered the forty pounds she owed.

Unfortunately there were a few crossed wires somewhere and Sarah was cut off anyway. She complained. Nothing unusual in that, of course. People are always complaining about BT.

What is interesting is the fevered response her complaint seems to have generated. Not only was she swiftly reconnected, but BT has launched an internal inquiry into why this cock-up occurred in the first place.

Optimistic to the end, I would like to think this is indicative of a new era of customer responsibility at BT, but I can't help feeling there were other factors in play here.

You see, Sarah Carsberg just happens to be the daughter of Sir Bryan Carsberg, who just happens to be the boss of telephone watchdog Oftel, the permanent thorn in the side of BT's prancing piper.

BT Charges Frustrate Competitors

The government has received proposals from over 20 companies wanting licences to run telecommunications services, but a large number are expected to pull out because of restrictive interconnection charges.

Following market deregulation in March, the department of Trade and Industry has received bids from companies keen to compete with BT and Mercury. But the proposed new system of connection to BT's network is seen as anti-competitive.

Vivienne Peters, chief executive at the Telecommunications Users' Association, said since the access connection proposals were announced members had expressed pessimism over the likelihood of any real competition.

"The proposals are a barrier to competition as profit levels will be too narrow for reinvestment. As companies are still unsure of what the costs will be it is difficult to make business plans. I expect a huge fall off in interest," said Peters.

Recently John Redwood, corporate affairs minister at the DTI, said a number of the twenty proposals included "substantial telecommunications systems and innovative technological approaches."

National Transcommunications, the engineering arm of the former Independent Broadcasting Authority, has expressed interest in providing telecom services.

A spokesman for National Transcommunications said the company was considering a number of options that combined its traditional broadcasting skills with telecommunications.

***

Northern Telecom has won a 6.8 million pound contract from BT's internal networks organisation. Northern Telecom is supplying an automatic call distribution system to speed up BT's pick-up rate on customer enquiries in Greater London.

***

Dowty Communications, in collaboration with local supplier Omnicron Praha, has won orders in Czechoslovakia totalling 700,000 pounds. Dowty is to provide business and technical support as well as hardware, including X.25 packet switching networks, to the Czechoslovak state and commercial banks.

2600 MEETINGS

New York City

Citicorp Center, in the lobby, near the payphones, 153 E 53rd St., between Lexington & 3rd. Payphones: 212-223-9011,8927; 212-308-8044,8162.

Poughkeepsie

South Hills Mall, off Route 9. By the payphones in front of Radio Shack, next to the food court. Payphones: 914-297-9823, 9854, 9855.

Washington DC

Pentagon City Mall in the food court.

Cambridge, MA

Harvard Square, inside "The Garage" by the Pizza Pad on the second floor.

Danbury, CT

Danbury Fair Mall, off Exit 4 of I-84, in the food court. Payphones: 203-748-9995, 203-794-9854.

Philadelphia

30th Street Amtrak Station at 30th & Market, under the "Stairwell 7" sign. Payphones: 215-222-9880, 9881, 9779, 9799, 9632; 215-387-9751.

Pittsburgh

Parkway Center Mall, south of downtown, on Route 279. In the food court.

Fort Lauderdale

West Hollywood Bowling Alley, 296 South State Route 7. Call voice mail for details or changes: 305-680-9214, 100#.

Atlanta

Meetings announced on local BBS (404) 612-0340.

Chicago

Century Mall, 2828 Clark St., lower level, by the payphones: 312-929-2695, 2875, 2665, 2994, 3287.

Ann Arbor, MI

Galleria on South University. Payphones: 313-663-9727, 9410.

Bloomington, MN

Mall of America, food court.

St. Louis

Galleria, Highway 40 and Brentwood, lower level, food court area, by the theaters.

Austin

Northcross Mall, across the skating rink from the food court, next to Pipe World. Payphones: 512-453-9834, 9865, 9916.

Los Angeles

Union Station, corner of Macy & Alameda. Inside main entrance by bank of phones. Payphones: 213-972-9358, 9388, 9506, 9519, 9520; 213-625-9923,9924; 213-614-9849, 9872, 9918,9926.

San Francisco

4 Embarcadero Plaza (inside). Payphones: 415-398-9803,4,5,6.

Seattle

Washington State Convention Center, first floor. Payphones: 206-345-9300, 9301, 9304, 9309.

Munich, Germany

Hauptbahnhof (Central Station), first floor, by Burger King and the payphones. (One stop on the S-Bahn from Hackerbruecke - Hackerbridge!) Birthplace of Hacker-Pschorr beer. Payphones: +49-89-591-835, +49-89-558-541, 542, 543, 544, 545.

All meetings take place on the first Friday of the month from approximately 5 pm to 8 pm local time. To start a meeting in your city, leave a message and phone number at (516) 751-2600.

WHY SUBSCRIBE?

SOME OF YOU WHO PICK US UP ON NEWSSTANDS HAVE BEEN CALLING TO TELL US THAT IT'S CHEAPER TO BUY 2600 ON THE STANDS THAN IT IS TO SUBSCRIBE! WE KNOW MANY MAGAZINES OFFER NEWSSTAND DISCOUNTS. DRUG DEALERS ALSO OFFER THEIR PRODUCTS AT LOWER PRICES UNTIL YOU GET HOOKED. BUT THAT'S A BAD ANALOGY. SO WHY SUBSCRIBE? YOU WON'T HAVE TO ENGAGE IN DEGRADING STREET BRAWLS OVER THE LAST ISSUE IN YOUR LOCAL BOOKSTORE. YOU WON'T HAVE TO TOSS AND TURN AT NIGHT WONDERING IF THE BOOKSTORE CLERK IS ACTUALLY AN INFORMANT WHO WILL TURN YOU IN FOR READING SUBVERSIVE MATERIAL. YOU WON'T FACE THE RIDICULE AND SCORN THAT COMES FROM ASKING FOR A MAGAZINE THAT NOBODY ELSE HAS HEARD OF. BY SUBSCRIBING, YOU <u>WILL</u> GET YOUR ISSUES DELIVERED RIGHT INTO YOUR OWN HANDS A GOOD TWO WEEKS BEFORE THEY HIT THE STANDS. NO NEED TO GO OUTSIDE AND RISK INFECTION. AND ONLY SUBSCRIBERS CAN TAKE ADVANTAGE OF THE FREE 2600 MARKETPLACE!

INDIVIDUAL SUBSCRIPTION

□ 1 year/$21 □ 2 years/$38 □ 3 years/$54

CORPORATE SUBSCRIPTION

□ 1 year/$50 □ 2 years/$90 □ 3 years/$125

OVERSEAS SUBSCRIPTION

□ 1 year, individual/$30 □ 1 year, corporate/$65

LIFETIME SUBSCRIPTION

□ $260 (also includes 1984, 1985, 1986 back issues)

BACK ISSUES ($25 per year)

□ 1984 □ 1985 □ 1986 □ 1987 □ 1988

□ 1989 □ 1990 □ 1991 □ 1992

(OVERSEAS: ADD $5 PER YEAR OF BACK ISSUES)

(individual back issues for 1988 to present are $6.25 each, $7.50 overseas)

TOTAL AMOUNT ENCLOSED: □

PLEASE WRITE YOUR NAME AND ADDRESS ON BACK